Suburban TOD Feasibility Analysis and Design

Paul Ford
December 2010

Submitted towards the fulfillment of the requirements for the Doctor of Architecture degree.

School of Architecture
University of Hawai‘i

Doctorate Project Committee
Pu Miao, Chairperson
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We certify that we have read this Doctorate Project and that, in our opinion, it is satisfactory in scope and quality in fulfillment as a Doctorate Project for the degree of Doctor of Architecture in the School of Architecture, University of Hawai'i at Mānoa.

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PROJECT STATEMENT

Suburban communities are very common in America. The private yard, house, and car are part of the American dream. Our vast network of roads and affordable fuel has allowed a pattern of development that is sustained by driving cars. Times have changed, however, with traffic, fuel prices, and global warming trends threatening. We understand the problems associated with sprawling suburban communities, but how can we change something as permanent as land use? Mass transit is a potential solution. If people live within walking distance train station, in a vibrant mixed-use community, they could rely less on automobiles.

A "transit-oriented development" (TOD) refers to a mix of development within walking distance to a train or bus station. TOD currently has a lot of public support. It is clearly a good idea but is it *feasible*? Is there enough demand from the public and enough government support to promote TOD in the private sector? We are in the midst of a deep recession, and construction is at an all-time low. Can a developer be expected to take on the risk of an unproven type of Development?

The goal of this project is to design and analyze the feasibility of a transit-oriented development at a suburban site. The site is within 3 minutes walking distance to a new MBTA commuter rail station that serves the greater Boston area. The one and a half acre parcel is within a commercial village overlay zone that was recently re-designed by the Town of Scituate for the new Greenbush train station.

The research methods for this design project begin with background research on transit-oriented development and feasibility studies. It is followed by a site analysis including history, climate, culture, demographics, transportation, zoning and codes. Design standards for the building program are then researched.

The research documentation involves gathering financial data for the cash flow feasibility studies. The real estate market is analyzed to determine income figures for rentals or sales and projected inflation over time. Costs are then researched to determine all expenses associated with construction at the project site. One case study is performed on a comparable TOD in an adjacent suburban town.

I created an original design for the site that is based on this research. The design concepts that

are described in this project are inspired by a desire to create a successful and feasible TOD for the project site.

Finally, the financial data gathered in research documentation is used to create pro-forma cash flow statements that analyze the feasibility of my design. Three economic scenarios are used to analyze the design; all rentals, all sales and a mix of rentals and sales. The conclusion of the research is an analysis of the feasibility studies.

BACKGROUND RESEARCH

TRANSIT ORIENTED DEVELOPMENT

Transit-oriented Development (TOD) is a relatively new term to describe a pattern of development around a transit stop. Despite the new acronym, TOD has been around as long as there have been passenger trains. Before the automobile, people would migrate away from the urban core and use trains for access to the city. The train stations in the greater Boston area were once the centers of thriving villages. The project site was once a thriving TOD back in the 19th century, but the original Greenbush passenger train was discontinued in the 1950's as automobiles became the preferred choice of travel.

50 years later, a new line has been built to help deal with suburban sprawl and a traffic problem in the Boston area. The new MBTA Greenbush commuter rail service runs through into the neighborhoods that I grew up in. A commuter line is significant new addition to my old neighborhood and its effect on land use is what piqued my interest in transit-oriented developments and led me to investigate the feasibility of suburban TODs.

The American Planning Association describes transit-oriented development (TOD) as development within a 10 minute walk from a transit station. Ideally, TOD is supported by a mix of uses including housing, retail, and offices. TOD should also be more densely populated than the surrounding areas and should supply abundant pedestrian connections. At minimum, TODs should have at least 100,000 square feet and about 60-80 housing units[1].

According to Landscape Graphic Standards, a transit-oriented development will should follow the basic planning policies of New Urbanism. These planning policies are not traditional policies in the United States and must be adopted by the local planning commission in order for a TOD to be possible. Some of these include[2]:

- General plans that promote the concept of mixed use
- Establishment of "overlay" zones that allow mixed use near transit stops
- Urban design and built form guidelines that promote (or require) streets, public spaces and urban development to be pedestrian-friendly

[1] American Planning Association, *Planning and Urban Design Standards* (Hoboken: John Wiley & Sons, Inc., 2006), 450.
[2] Leonard J. Hopper, *Landscape Architectural Graphic Standards* (Hoboken: John Wiley & Sons, Inc., 2007), 228.

- Parking policies that control parking inventory and pass expenses onto automobile user.
- Establishment of TOD visions and plans through public workshops
- Proactive development of TOD through developer incentives and public/private joint ventures

Maximizing density in the TOD and providing a mix of uses is a key to a successful TOD. The density should be based on the demographics of the area and what is feasible. In general, the density within the core of the TOD should be highest, with lessening density further from the station. (Figure 1)[3]

The area within 1/8 of a mile or within 5 minute walk from the transit stop is considered the hub area. Ideally the density of the hub is higher than the surrounding areas and the mix of uses more diverse. Radiating from the hub area is the core area within ¼ mile or a 10 minute walk. The ideal core area has high to medium density, and a mix of attached and detached buildings. Outside of the core, within a 20 minute walk, is considered a secondary or support area for the TOD with consisting of housing.[4] The site for this project is located within 1/8 mile of the transit stop and is within the "transit hub area". The zoning for the project site allows for much greater density than the surrounding and more height.

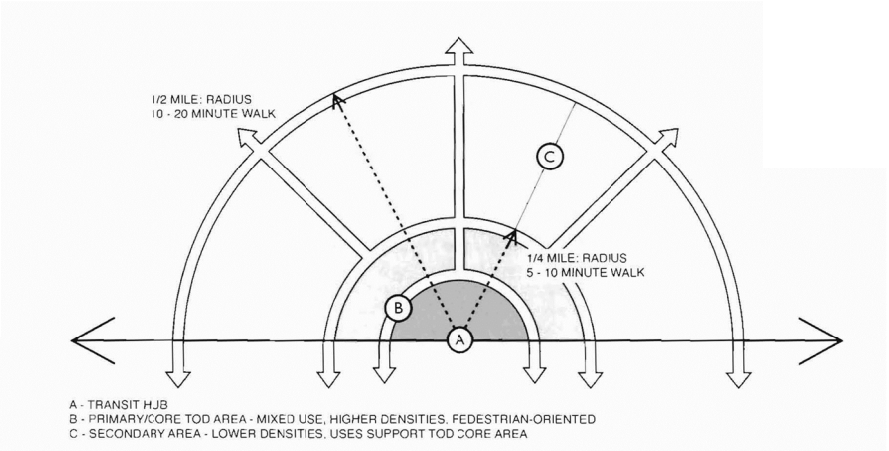
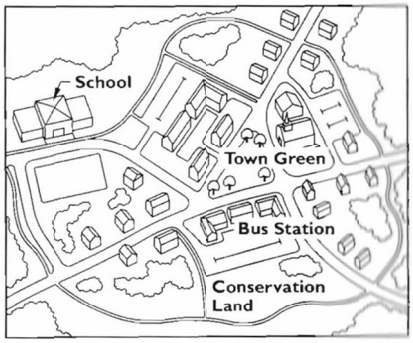


Figure 1 Areas surrounding transit are typically less dense as you move away from the hub.

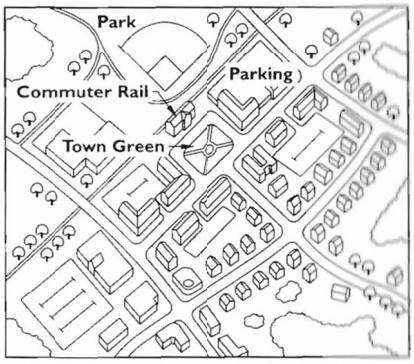
[3] Ibid., 230.
[4] Ibid.

The variety of layouts and densities for TOD can vary depending on the site location. In general, they can be broken up into three types, a rural TOD, a suburban TOD, and an urban center TOD (figure 2)[5]. The site for this design project would be considered a Suburban TOD.



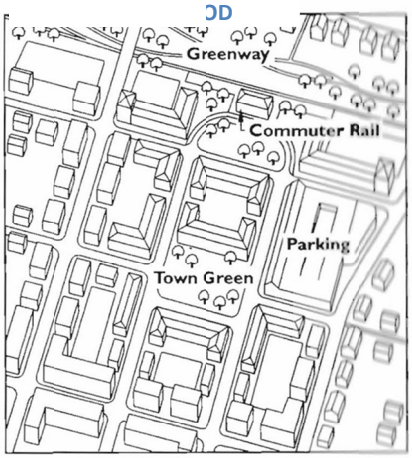
Rural TOD

A mix of uses is an ideal characteristic of TODs. APA says, "enliven sidewalks and public spaces with as much retail as the market will support, provide tax revenue generating income-producing commercial development, and provide opportunities for residential to be located adjacent to or above such uses."[6] By allowing the mixing of uses in planning, pedestrians have quicker access to a range of services and the vibrancy and popularity of the spaces will be enhanced.



Suburban TOD

Another key to TOD success is to provide a diverse mix of residential options. The intent here is to supply the market with housing for people who can't afford a typical suburban detached home or simply prefer to live in a TOD. Diverse housing options include affordable housing, housing for young professionals, elderly housing, rental housing etc. According to the Urban Land Institute, The demographics of the future are such that by 2025 people looking for homes will have fewer children and will be demanding smaller housing units.[7]



Urban Center TOD

TYPES OF TRANSIT-ORIENTED DEVELOPMENT

Source: Goody Clancy.

Pedestrian access is one of the primary components in a successful TOD. The APA says it should "provide convenient, direct and public pedestrian access to transit through TOD projects". The pedestrian experience should be enriched. Larger street front

[5] American Planning Association, *Planning and Urban Design Standards* (Hoboken: John Wiley & Sons, Inc., 2006), 451
[6] Ibid.
[7] Ibid., 451

windows and entries enhance the experience and connect the pedestrian to the activities within the buildings. Additionally, parking should be screened from view by buildings or vegetation.[8] It is best for parking to be out of sight as it is a detriment to the experience of a pedestrian.

Another aspect of successful TOD is good design of buildings. The layout of buildings and public spaces can encourage a unique sense of place. Quality architecture that compliments the surrounding communities can give a sense of ownership to the community. APA says to "Orient buildings to new and existing streets and squares. Use transitions in height and massing to respect, but not mimic the fabric of nearby districts…encourage architecture that reflects transit's civic importance, creating buildings that, regardless of architectural style, employ materials and design that convey a sense of quality, permanence and community enriching character."[9]

Parking requirements within TODs should be reduced. It is a main goal of TOD to increase transit use and lessen automobile use. In Massachusetts, it is common for TOD's to have parking requirements 33 percent lower than comparable projects.[10] One way to encourage the need for fewer parking stalls is to pass on the expense of parking to the automobile user.

Another key component to TOD is to reinforce good sustainable practices such as minimizing impervious surfaces, use of sustainable materials, and maximizing energy conservation.

Perhaps the most important component of a successful TOD is the relationship between the developer and the public interest. It is common for a TOD to involve cooperation between public and private interests. Often it is the responsibility of the public sector to make sure that the community's goals are addressed. APA says "In many cases, the public sector must make initial investments to create a site adjacent to a transit station, contribute publicly owned parking lots, or invest in new local access to the TOD site. Where the private sector controls a TOD site, it is often necessary to collaborate on planning and design to create appropriate connections between development and transit."[11]

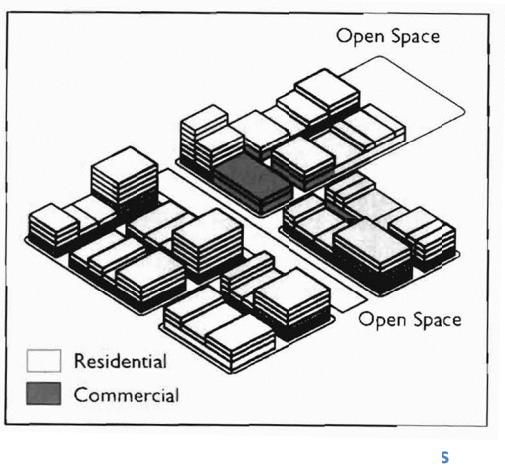
Proper planning on the city level is another key component of a TOD. TODs are inherently complex given the number of participants affected by it, and Implementing TOD effectively

[8] Ibid.
[9] Ibid
[10] Ibid.
[11] Ibid.

requires significant planning. According to the APA, "It is often the lack of planning, rather than the lack of demand, that slows or blocks a transit-oriented development." There are several ways to address this, and they include partnerships among the main participants such as the transit agency, local government, the developer, and the community. A planning study should be implemented to "resolve issues such as parking, site access, relationship to existing neighborhoods and commercial districts"[12]. Another effective planning technique is to provide design guidelines and a design review process.

MIXED USE DEVELOPMENT

A mix of uses is the preferred type of development for a TOD. The mix of uses can be separated vertically, normally with commercial below and residential above, or it can be separated horizontally with the mix of uses side by side. A "mixed use walkable area" as suggested in Planning and Urban Design Standards, combines both of these strategies (figure 3)[13].



Mixed use developments have several distinct advantages[14]. A mix of uses helps to create a sense of place and revitalize an area. Mixed use is considered to be a sustainable and efficient method of development as there can be sharing of utilities and amenities. It also is pedestrian friendly, convenient, and safer than typical separated uses.

Mixed use developments also have distinct challenges[15]. Many zoning ordinances across favor single use districts and zoning changes or variances are required to develop using mixed uses. Financing can also be an issue as it is not yet a commonplace type of development and banks are wary to provide financing. Vertical mixed use can cause planning and management issues that don't exist with single use buildings. There are complexities with building codes and approvals and that add to cost and time management.

[12] Ibid.
[13] Ibid., 448.
[14] Ibid.
[15] Ibid.

The background research on TOD reveals that the project site provides ample opportunity to become a successful component of a TOD. The land has been re-zoned to be transit-oriented development friendly by the Town of Scituate. The *Village Business Overlay District* in Greenbush allows for a much higher density development than the surrounding area, up to 20 units per acre, and allows for a wide mix of pedestrian friendly commercial services. The planning board also has a design review board to oversee the form based design codes that retain the historic village character.

FEASIBILITY ANALYSIS

Financial feasibility analysis exists from the very beginning of a project to the end. It could start out as a "back of the envelope" pro forma with simple calculations based on rules of thumb that are familiar to the developer. Its form changes constantly, as newer and more accurate information becomes available. The final analysis is much more accurate than the first, but it is very important use the analysis early and often during the planning stages. Knowing which opportunities make the most reasonable sense early on cam help a designer make significant changes without significant costs.

So what's the bottom line? Even the most sure headed developers need to perform some kind of financial feasibility analysis to answer that question. The answer can be derived from financial feasibility analysis. To create a typical pro-forma financial statement for a real estate development, the potential income from rent or sales is weighed against the estimated cost of total construction and land costs. Cash flow is measured over time, however long it takes from planning to the final sale or lease of property. Financing costs, tax implications and inflation are factored in. The results can predict return on cash investment, a key indicator for investors.

An important note is that the feasibility analysis only conveys "reasonable likelihood" and is not a guarantee of success. Feasibility never demonstrates certainty. It is of upmost importance to be sure that the numbers are right and not influenced. It's easy to make a financial study look the way you feel it should, even unwittingly. All numbers should be checked twice. Furthermore, the use of cost estimating and feasibility software is encouraged as they have the latest data and reduce human error. Feasibility studies are only as strong as the weakest link in the data. According to author Mike Miles, "The more time and effort that go into estimating all revenues and costs, the more likely it is that the development decision will be sound, In almost all cases, the better the forecast, the less risk involved in the development"[16].

Financial Feasibility studies can be broken up into a series of studies that are linked. First, a *Market Study* looks at the larger market forces in an area such as demand and supply for rentals. Second, a *Marketability Study* examines supply and demand on a smaller scale, such as the demand for local housing and preferences. Third, the *Feasibility Study* measures the costs and

[16] Ibid., 359.

income potential for a variety of potential uses. Once the feasible scenarios have been identified, there should be consideration of *Highest and Best Use*. Typically this is the scenario that has the most profit after considering all outside factors. The feasibility study ultimately becomes an *Investment Analysis* considers cash flow, financing, and tax implications. The format for and investment analysis is often called pro-forma[17].

In theory, feasibility analysis is not just for profit maximization. The studies must be comprehensive and sensitive to the socio-political environment of the site. The forces of the public will are strong and are considered carefully, especially in the marketability study. "It is not just a matter of satisfying the developer's explicit objectives, though such objectives may be the initial driving force. The other players have objectives that must be met, the most important of which are the objectives of the public sector partner and the final user."[18] In designing a project for this site, I will not be simply aiming for profits, but a complete package that is sensitive to the needs of the end user and stakeholders as well. My design concepts are aimed at finding the most sustainable and effective design for the money spent and to avoid unnecessary expenses. The goal is to provide end user valued amenities that cost the same or only a small amount more than an average development.

MARKET STUDY

A market study is an analysis of the larger macroeconomic forces that affect a region. It is commonly used to determine which regions are ripe for development. The focus is on supply and demand. For the given site in Greenbush the "supply" would be the inventory of existing vacant space for rentals or the number of available properties on the market for sales. The demand for housing or commercial space is the other side of the market study. Demand can be determined by wages and employment data, inflation, consumer price index, population demographics. This information can be found in census data and other studies provided by larger real estate companies for a fee. According to Real Estate Development Principles and Practices, "Potential space users are usually identified by analyzing the expected needs and preferences of users as well as the expected changes in needs and preferences. An analysis of

[17] Stephen Messner, Bryl Boyce, Harold Trimble, and Robert Ward, *Analyzing Real Estate Opportunities: Market and Feasibility Studies,* (Chicago: Realtors National Marketing Institute, 1977), 79-86.
[18] Mike E Miles, Gayle Berens, and Marc A Weiss, *Real Estate Development Principles and Practices.* (Washington: Urban Land Institute, 2000), 339.

regional demographic, employment, or income data is often the first step in a demand analysis"[19].

The most important parts of the data are the trends that can be found. Forecasting the future is always tricky, but developers rely on this information to determine make their next move. According to Miles, "What is frequently more important to real estate developers is how these numbers change over time. Existing demand generally fills existing space, but changes in the factors listed above often create demand for new space"[20].

A frequent problem with obtaining market information is that it is hard to find. According to Miles, "Real estate traditionally has been a private industry, and, despite its recent more public incarnations in the form of REITs and commercial mortgage-backed securities, it continues to be intensely private. Some people believe that relevant information is almost impossible to obtain and/or that sources willing to volunteer information fabricate their responses."[21] Fortunately for those without real estate insider info, market data can now be purchased from major online real estate companies such as www.reis.com. Their data packages include new construction, rent comparables, sales comparables, and financial tools. Quarterly submarket (not major market) trend data for South Suburban Boston can be purchased for $175.

One component of demand that must be considered for the Greenbush site is the arrival of the new commuter rail and the projections for the use of the train. If the train is wildly popular, the development will benefit from increased demand. If the train is a disappointment, the demand will remain flat.

According to a study the Center for Urban Transportation Research, it's the opinions of the local suburban homebuyer that affects demand for a new type of development such as TOD. "The individual homebuyer is the single most powerful decision making unit in shaping suburban land development. Those who support the application of TOD cite more mobility choices, less traffic congestion, and improved air quality as benefits to residents of TOD; however, it is not clear that these benefits are motivating factors for suburban homebuyers and apartment lessees to

[19] Mike E Miles, Gayle Berens, and Marc A Weiss, *Real Estate Development Principles and Practices.* (Washington: Urban Land Institute, 2000), 364.
[20] Ibid.
[21] Ibid., 392.

relocate to a TOD."[22] Therefore, getting a feel for the mindset of the homebuyers is an important part of a market study.

MARKETABILITY STUDY

A marketability study focuses in on the details of the types of properties being offered. The goal is to find the price and absorption rate of a specific type of unit, for instance a 2bedroom 2 bath apartment. How much time and at what price does it take to rent or sell thirty 2 bedroom apartments? Finding information such as this is the goal of the marketability study. The study may go further to specify whether the 2 bedroom apartment has covered parking or modern amenities. The idea is to take a specific type of property and figure out what price it can be sold or rented at and how many months or years will it take to clear out the inventory. These numbers will be used in the next step, the feasibility study. I plan to use some of my local real estate connections to obtain this information. I have gained access to the MLS data system through a friend and can gain specific data on prices and length of time on the market for various types of properties.

FEASIBILITY STUDY

The feasibility study is the heart of the analysis where all of the relevant data is stored. The format of the study is a cash flow or pro-forma statement. For this project I use a cash flow spreadsheet because it can account for variables that are happening at different times like construction time, the duration of sales (absorption rates), future market projections, and cost of living index.

Income is the first component of the analysis. The data comes from research from research during the market study and marketability study. For this project, I will be researching sales of one and two bedroom condos, the lease rates for condos, and the market for commercial sales and leasing. I will come up with an average rate per square foot for each that can be plugged into the feasibility study.

Cost is the second component to the feasibility study. There are several ways to measure construction costs. In the early stages, before highest and best use has been determined, and a

[22] Julie Goodwill, *Building Transit Oriented Development in Established Cities,* (Tampa: Center for Urban Transportation Research, 2002), 1.

developer wants to compare several potential uses for feasibility, costs are based on square foot costs. Square foot costs are derived from years of contractor reports from completed projects. These are numbers are available from major construction publishers such as RS Means and McGraw Hill. For this study, I will be using RS Means Costworks, an online resource that has all of the most recently released data on building materials, labor, services and market multipliers to apply to locations. In addition to construction costs, the feasibility study analyzes all of the soft costs related to construction such architectural, engineering, legal and permitting, site infrastructure, real estate commissions, and project management.

Time is the third major component to the feasibility analysis. By using a cash flow analysis of 5 to 15 years, a developer accurately track income and expenses for any time period. This is very useful, especially for developments with a loner scope such as rental apartments where decent returns can take a decade or so.

WEAKNESSES OF FEASIBILITY STUDIES

There are several common mistakes found in feasibility studies. The first is a lack of attention to the indirect forces that affect the site. These include "the environmental, social, and political concerns of the community, and more specifically, those interests that will be directly affected by the project. It is not an easy matter to properly assess the concerns of citizens and their elected representatives."[23]

Another weakness of feasibility studies is a human tendency to make the report show positive numbers. It is not good practice, but it is common for analysts to use best case figures for their studies[24]. Overly optimistic sales prices, low construction costs and high absorption rates tend to create a rosy scenario, but this can be to the downfall of the developer. For this project I have been very careful to not fall into this trap. I make a point to be accurate and conservative with the data.

Another problem frequently encountered in market and feasibility analysis is an underestimating of the total infrastructure cost of the proposed development.

"In most cases, the most difficult cost to estimate accurately is infrastructure. Without extensive

[23] Vincent G Barrett and John P. Blair, *How to Conduct and Analyze Real Estate Market and Feasibility Studies,* (New York: Van Nostrand Reinhold Company, 1982), 307.
[24] Ibid., 309.

> *borings, it is difficult to know where rock is located and hence how expensive it will be to route pipe around it, and even with the advice of the best soils engineer, sometimes the handling of water is more expensive than expected. Every experienced developer can relate war stories about problems encountered during construction -and underestimating the cost of infrastructure often heads the list."*[25]

Without proper soil testing it is difficult to know what will be involved with excavation, drainage, and wastewater treatment. Simple estimates can often be misleading. Unfortunately this site has a few unknowns in this area. The site is within a watershed protection district and site design is overseen by a design committee. The site will also likely require septic tanks and leeching fields (there is street connected sewer available, but with extremely costly fees). This will be difficult in a high density site in an environmentally protected area.

Another weakness is an over reliance on statistical analysis. "Often, models are used to cover the fact that little or no practical data has been gathered and analyzed. Generalized models are seldom appropriate for use in a specific case."[26] In this modern world where computers do much of the analyzing for us, it is easy to rely on them too much. Analyzing statistics should be backed up by more localized research. According to author Vincent Barrett,

> "*In most market studies it is necessary to address the question of consumer preferences. These preferences may relate to questions concerning specific types of dwelling units desired, size requirements, locational preferences, amenities desired, and ownership patterns…The present methods of economic analysis are only poorly suited to this important area of study. The determination of consumer preferences with respect to the development of real estate resources is an area of study that is still in its infancy. There are a few firms that are active in the area of surveying consumer preferences and attitudes with respect to real estate, but this type of analysis is sorely lacking in the typical market study being produced today."*[27]

For this design project, I did consider statistics and trends, but it was not my primary focus because most of the statistical models available were either very expensive, or they were geared to the larger metropolitan area and didn't seem relevant to the unique small town of Scituate, MA.

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[25] Mike E Miles, Gayle Berens, and Marc A Weiss, *Real Estate Development Principles and Practices.* (Washington: Urban Land Institute, 2000), 347-348.
[26] Vincent G Barrett and John P. Blair, *How to Conduct and Analyze Real Estate Market and Feasibility Studies,* (New York: Van Nostrand Reinhold Company, 1982), 307-309.
[27] Ibid.

SITE ANALYSIS

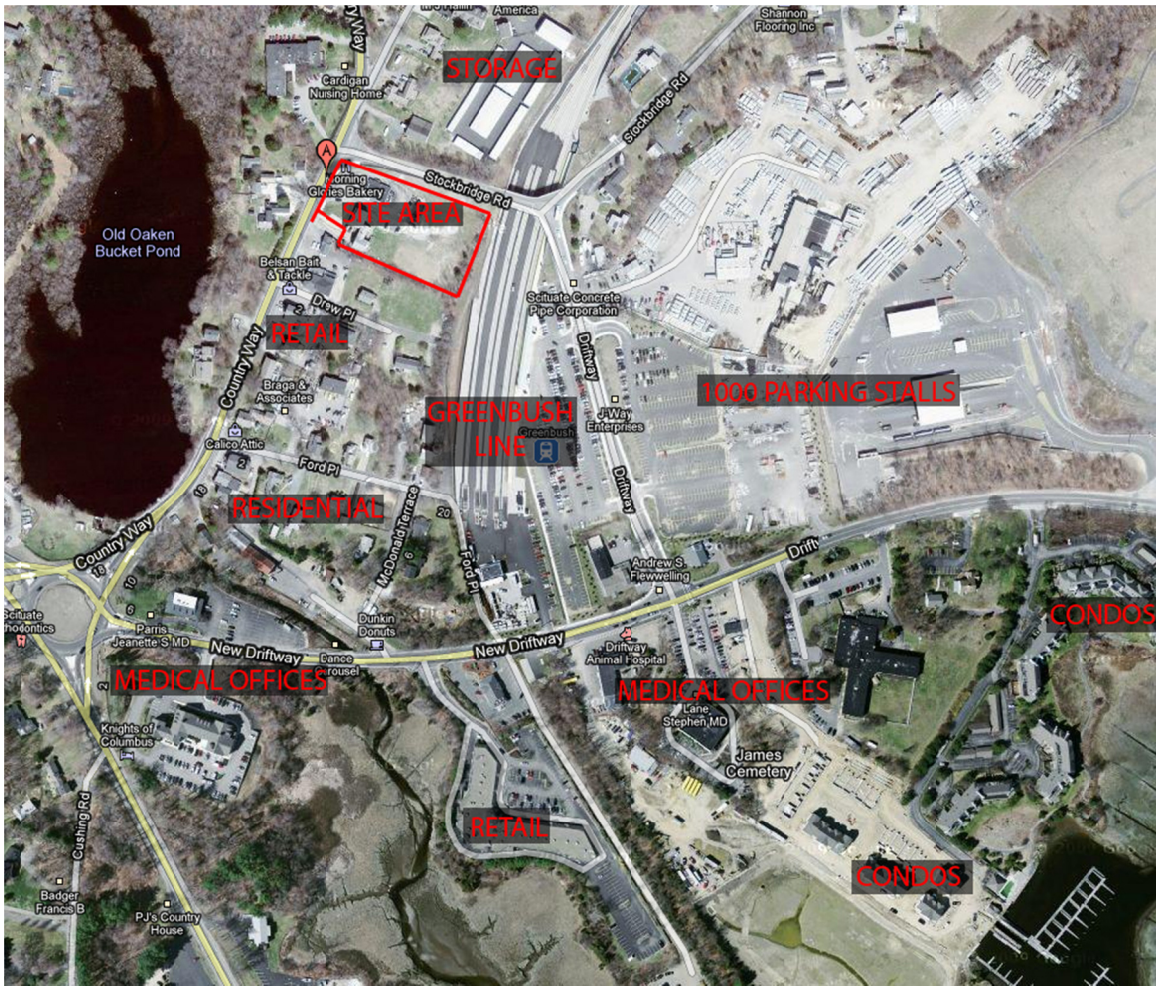


Figure 4 Greenbush Area[28]

The address of the project is 50 Country way in Scituate, MA and it is located the historic village of Greenbush. The final stop of the MBTA's new Greenbush commuter rail is within a few minutes walking distance. The town of Scituate has recently changed the zoning in the Greenbush area to allow for higher density and mixed use. This is in response to the new the train station and the general need for affordable housing and vibrant neighborhoods. With the new zoning, the land could be developed with up to 31 units. The total developable land is approximately 1.5 acres.

[28] Google. "Google Maps". http://maps.google.com/

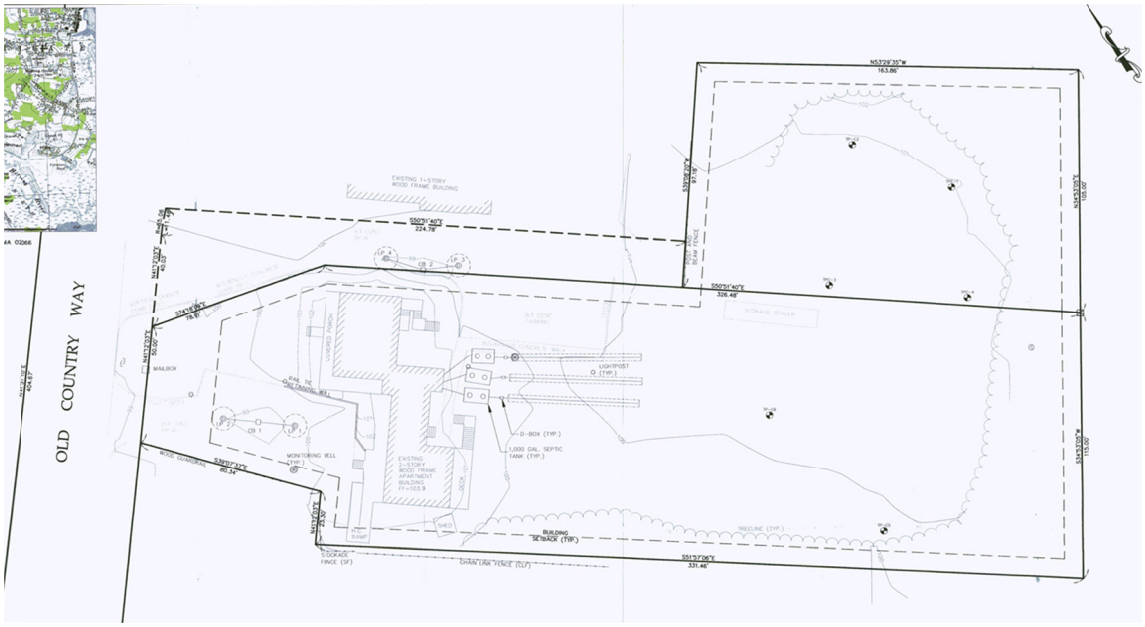


Figure 5 Survey of 50 Country Way[29]

There is an existing wood structure near the street front that was built in 1890 (figure 7). I was once the property manager of this building and it's a reason that I'm interested in this site. The 50 Country way building has 5 residential apartments. It had been mixed use in the past with an insurance company and flower shop being the most successful retail services. Now the building consists of only apartments. The 1 and 2 bedroom apartments usually rent for $1000-$1800 per month.

The site has a short street frontage on Country way of only 50' (figure 5). The majority of the land is out of sight from the main street. This narrow street front configuration lends itself more to residential than development retail. You can see the developable land from Stockbridge Street as you cross the bridge above the train tracks (figure 6). This neighborhood will likely undergo many changes in the coming years with the train and new zoning laws. Having a direct connection to into the heart of the Boston is a big deal for a this neighborhood. High density housing is also new for the village as most of the surrounding community consists of single family homes on large lots.

[29] Cavanaro Consulting Inc. "Plot Plan for 50 Country Way." Site Survey, 2006.

Figure 6 View of site and train station from Stockbridge rd.

HISTORY

The South Shore of Massachusetts is best known as the area where the pilgrims from Europe landed in America. The area is rich in history and is considered a desirable suburb of boston. The Greenbush community has a rich history going back to the 1600's. It was once the site of the oldest mill in the United States. The Stedman-Russell-Stockbridge Gristmill is now gone, but its location is marked and it is eligible for the National Registry of Historic Buildings and sites.[30] The Greenbush community later became a stop along the Old Colony Railroad in 1845 and the railroad operated for about a century before ending passenger service in 1959 due to the widespread use of passenger cars[31]. The Old Colony path was used for the new MBTA Greenbush commuter line with direct service to Boston. Greenbush is the final stop of the

[30] The Cecil Group, Inc. "The Greenbush Planning and Streetscape Study." 2003.
[31] Wikipedia. *Old Colony Railroad.* http://en.wikipedia.org/wiki/Old_Colony_Railroad (accessed November 21, 2009).

Greenbush line.

As is common in this area, the neighborhood has retained much of its character through the years. There is a general resistance to big changes and this attitude has kept the area rustic and authentic. According to the Cecil Group, "there are numerous buildings considered as contributing properties in a listed or eligible National Registry district given their age and architectural character, which testify to the value and significance of the village"[32] A large high density project in Greenbush will certainly have an impact on the historic quaintness of the village. Any new designs for this area should take into account the significant history.

CLIMATE

The climate in the Boston area has four distinct seasons. Summers are generally warm and humid, the spring and fall are cool and mostly pleasant, and the winter is cold and windy.

Month	Average high	Average low	Warmest ever	Coldest ever	Average dew point	Average precipitation
JAN.	37	22	72	-12	17	3.9
FEB.	39	24	70	-18	18	3.3
MARCH	46	32	89	1	25	3.9
APRIL	56	41	94	13	34	3.6
MAY	67	50	96	34	45	3.2
JUNE	77	59	100	41	55	3.2
JULY	82	66	103	50	61	3.0
AUG.	80	65	102	46	60	3.4
DEC.	42	28	76	-17	22	3.7

There is a wide range of temperatures throughout the year (Figure 8)[33]. The hottest recorded is 103 degrees Fahrenheit and the lowest is -17 degrees Fahrenheit. The temperatures can vary wildly in any given month. For instance, the normally frigid weather in January can have a delightful 65 degree day sent seemingly from heaven as a promise of the spring to come. Humidity is a factor in the summer when the dew point lingers around 60 in the hottest months.. Precipitation is heavy in the Boston area with an average of 3-4 inches per month. Summer has slightly less precipitation. Heavy snow is common in the winter.

The sunlight is valuable in this area. The typical day has grayness in the sky that permeates the region. The sun does shine brightly at times, but it is not the normal daily condition. There is an average of 58% cloud cover throughout the year.[34] In all but the summer months, sun exposure on a building is desired. The sun path diagram (Figure 9) shows the typical sun path

[32] The Cecil Group, Inc. "The Greenbush Planning and Streetscape Study." 2003.
[33] USA Today. *Boston, MA Climate.* http://www.usatoday.com/weather/climate/usa/mass/wboston.htm
[34] Kevin Ballard, *Climate Analysis - Boston, Ma.* August 13, 2007. http://kab-2.blogspot.com/2007/08/climate-analysis-boston-ma.html (accessed November 21, 2009).

during the year. This tool can be used to tell the angle and direction of the sun at any time of any day. The psychometric chart (figure 10) indicates the months in which the air has the humidity and temperature to be considered within human comfort levels (yellow box). The red line is the extension of the comfort zone to include when passive cooling through natural ventilation is possible. May through September are the only times when passive strategies are possible. According to the Ecotect weather tool, the optimum orientation for a building in the Boston area is to the south with a slight angle to the west (Figure 11)[35].

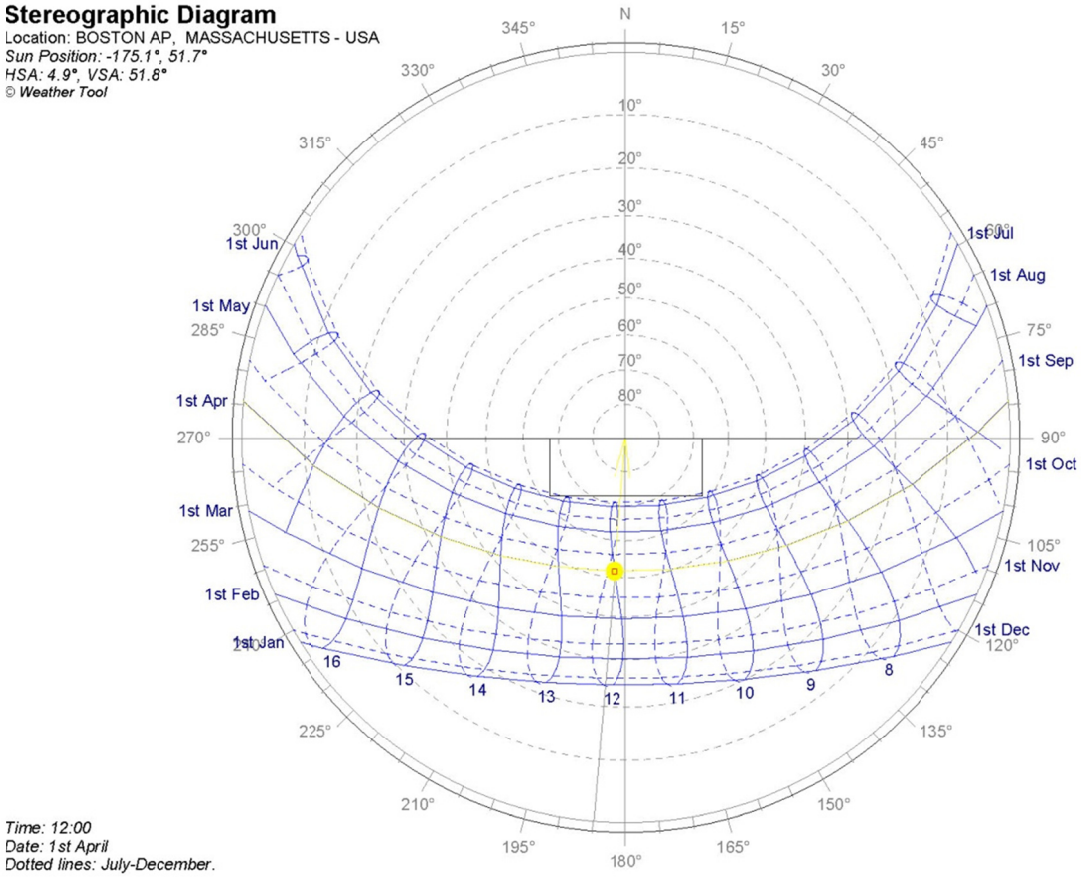


Figure 9 The angle and direction of the sun are always changing. This diagram shows the annual sun path for Boston[36].

[35] Autodesk, *Ecotect Weather Tool.* November 22, 2009
[36] Ibid.

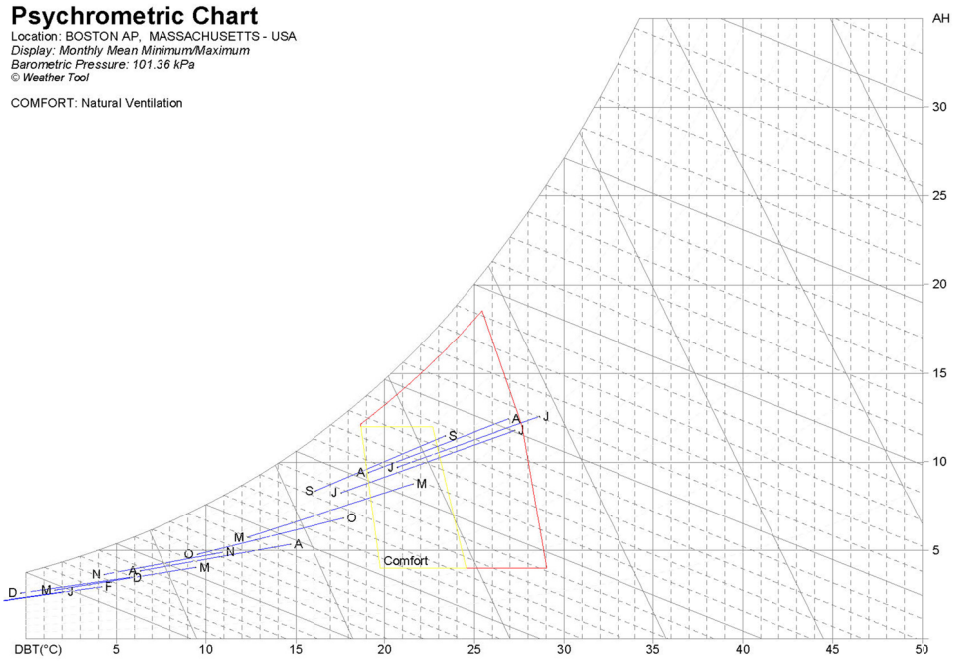
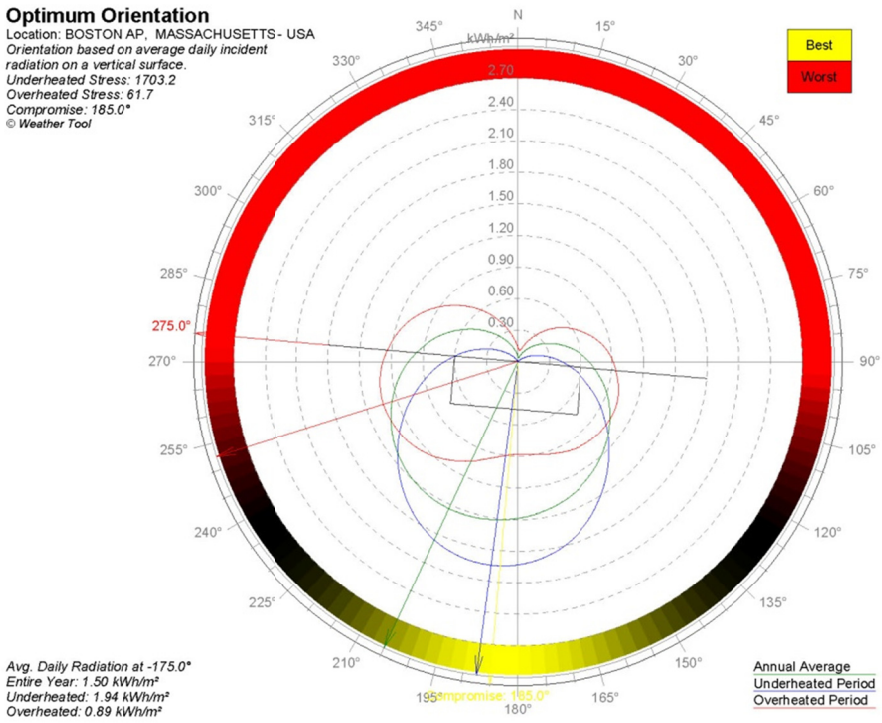


Figure 11 The spring and fall are the best times for passive heating and cooling strategies in Boston.[37]



[37] Ibid.

Unfortunately the wind patterns don't lend themselves to good passive cooling. When a breeze is needed most, the hot summer days, the wind is light and out of the south. In the cold winter, the wind picks up and is quite strong out of the northwest (Figure 12). It would make sense to protect the north and east sides of the building from the harsh cold winds. Southerly breezes should be welcomed by plenty of openings. Southerly openings will also help with passive heating during the winter.

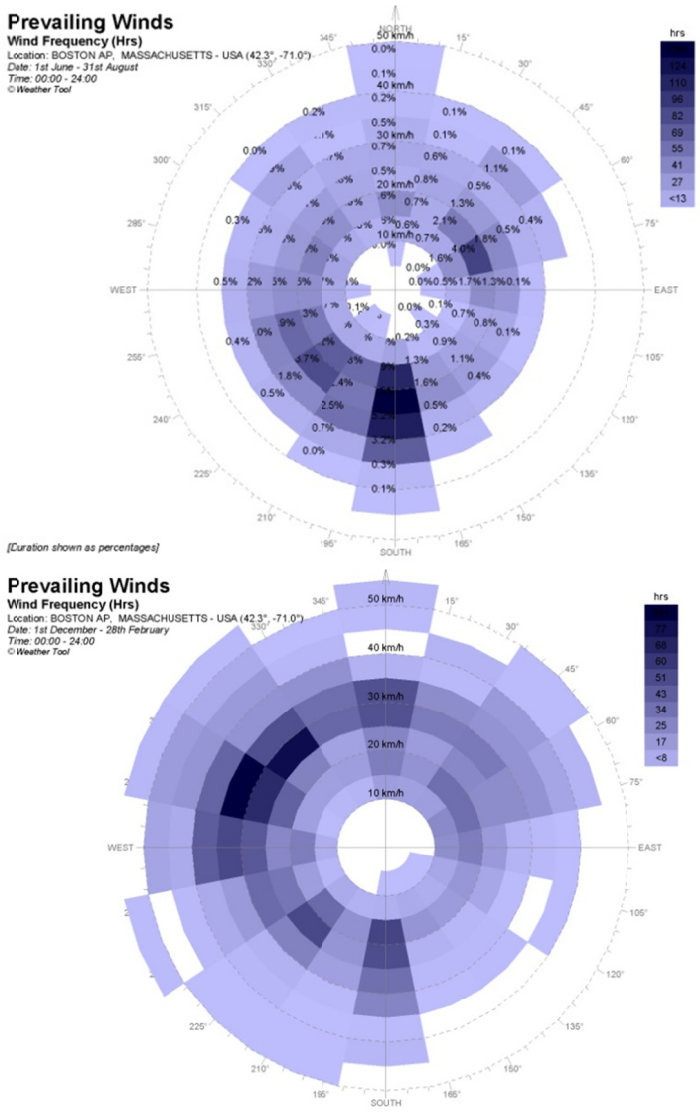


Figure 12 Soft southerly winds in summer and strong northerly winds in winter.[38]

[38] Ibid.

ENVIRONMENT

There is one environmental issue that directly influences this site. The site is located in at Water Resource Protection District. The nearby Old Oaken Bucket pond is a reservoir for the town's water supply. This protected district is overseen by the planning board and any use that "any use that may cause environmental pollution or contamination of water sources are expressly prohibited."[39] Furthermore, any new construction inside the district requires explicit permission. There is no given right to build within this district. The planning board will likely work with development within the area of the site because it is their desire for higher density development to take place here. They will oversee design and will require a minimum of impervious surfaces and proper drainage design. This situation raises the risk involved in developing the site and will likely add to costs.

[39] The Cecil Group, Inc. "The Greenbush Planning and Streetscape Study." 2003.

EXISTING LAND USE

The village of Greenbush can be described as quaint. The businesses are mostly small mom and pop stores. Though modest in scale, the existing businesses can provide a wide variety of services for local residents. Within 5 minutes walking distance from the site there are a variety of businesses including a grocery store, liquor store, 2 coffee shops, post office, auto repair shop, hardware store, dentists, doctors, professional offices[40]. For recreation, within 10 minutes walk there is a beautiful public golf course, a boating marina, a river for swimming kayaking and canoeing, walking paths, and baseball field. The Greenbush area has modest way of displaying its services and may at first glance seem too small or insignificant to support a thriving Transit-Oriented Development, but it really does have most of the components of a successful TOD at the suburban scale.

LOCAL VERNACULAR ARCHITECTURE

This area was settled by a variety of people from Europe and the local vernacular architecture is varied like its people. Unlike much of the United States, this area has quite a bit of older and historical vernacular architecture. There are very few subdivisions with cookie cutter homes. There is the perception from driving around these south shore towns, that every home is unique and tells a story about the people who have settled these lands since 1600.

The most common styles are Colonial, Cape, Victorian, and Dutch. The colonial is boxy with two stories and usually has contrasting shutters. The Cape style is low slung with a dominant roof. The 2nd floor of a cape is within the roof area and dormers protrude to provide light. The Victorian style is tall and expressive, with curves and extensive wooden moldings as ornamentation. The Dutch style has a distinctive convex roof form and expressive lines. Examples of these styles can be seen below (figures 13 thru 18)[41]. These are the most common historical styles. Some other common styles include converted barn, contemporary, and split level ranch. My favorite style is probably Victorian, but it is the mix of styles that create the richness and texture of the area.

[40] Ibid.

[41] MLS Property Information Network. *H3MLS.* http://www.mlspin.com/mlspin/index.html (accessed November 17, 2009).

Figure 13 Colonial style

Figure 14 Cape Cod style

Figure 15 Victorian Style

Figure 16 Dutch Gambrel style

Figure 17 Woodworking craftsmanship

Figure 18 Tudor Style

LOCAL DEMOGRAPHICS

The population of the town of Scituate is 5,256. The population is 95% white. The median age is 45 years, 7 years older than the Massachusetts median age of 37 years. The average household income is $98,348, $18,000 more than the state average.[42] Overall the population is older and wealthy. This overall makeup could be a challenge for a TOD because a younger working class is

[42] Real Estate.com. *Scituate, Ma Community Sumary.* http://www.realestate.com/MA/Scituate/local-info.aspx (accessed November 23, 2009).

the likely target for higher density housing near mass transit.

The household makeup is geared towards families with 73% of the households classified as family households, and 27% non-family households. Of these family households, however, 32% do not have children. So, about half of all households do not have children[43]. This could mean that half of the households might be interested in a higher density TOD living situation where there is not a need for many extra bedrooms for children.

The US census of 2000 has some interesting statistics about the housing types in Scituate, MA. 86% of people live in detached single family homes. 97% of all housing has at least 4 rooms. 99% of the population has 1 occupant or less per room. There aren't many cramped households. Additionally, 50% of the population has been in the same home for over 10 years, signaling that it is not a very transient population[44].

The Census has some relevant stats about commuting to work. The average commute time is 38 minutes. 78% of people are driving a car to work alone. 7% carpool to work and only 6% take public transportation[45]. The statistics about taking public transportation may be misleading because at the time of this census there was no public transportation to take directly to Boston from Scituate. A worker would have to drive a car to a subway station about 20-30 minutes away before taking public transportation.

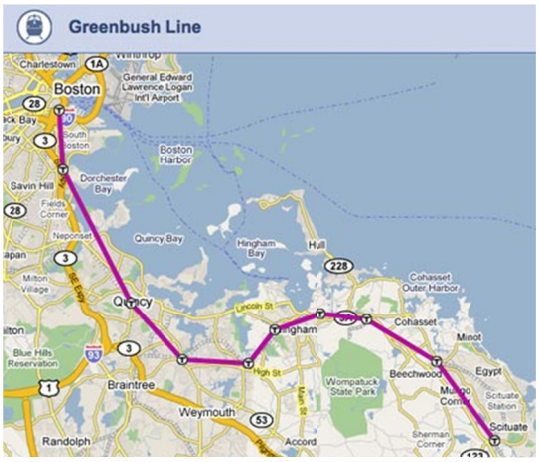
Overall I see a content population that has plenty of money and lots of extra space to live in. But, these statistics are almost 10 years old and may not accurately signal the need for more affordable housing. Within the past 10 years there have been significant changes in employment, personal wealth, commuting times and energy costs. I believe there has been a shift in thinking about higher density housing and the economic benefits of living in a TOD. The most promising statistic is that over 50% of the households do not have children and may want to make the sensible move to higher density housing and the conveniences of a TOD.

[43] US Census Bureau. *2000 Profile of Scituate MA.* Washington: US Census Bureau, 2000.
[44] Ibid.
[45] Ibid.

TRANSPORTATION NETWORK

AUTOMOBILE

The Greenbush area is in a convenient location for automobiles. It is strategically located at the intersection of Route 3A and Route 123, the two main roads connecting to the nearest interstate; US93. For getting around the south shore, you can't beat the convenience and flexibility of the automobile. But, commuting into Boston by automobile from this location can easily take 1.5-2 hours each way during peak travel times. The main interstate, route 93 is routinely clogged with traffic during commuting times.



COMMUTER RAIL

The Greenbush line commuter rail opened service in October 2007. It was an expansion of an existing commuter rail service serving the suburban areas of greater Boston. The new rail was part of a mitigation plan for the federally funded "Big Dig" project. In order to receive federal funds for the infamously expensive project ($14.6 billion), there state had to take measures to lessen automobile traffic. There are other reasons for the rail line including providing a mass transit option for the south shore, encouraging transit-oriented development patterns, and lessening air pollution. The cost of the new line was $512 Million[46].

There are eight new stops in the expansion including five stops in the surrounding towns of Cohasset, Hingham and Scituate (figures 19 & 20)[47]. The train is on grade with steel wheels on

[46] Massachussets Bay Transportation Authority. *MBTA Greenbush Project Frequently Asked Questions.* 2007. http://www.cbbgreenbush.com/faq.html (accessed November 23, 2009).
[47] Ibid.

steel rail and is powered by diesel engines. The passenger cars are high capacity with two levels and the line is expected to carry 8400 passengers per weekday. The peak speed of the train is 60 mph with a travel time from Greenbush Station to South Station in downtown Boston of 59 minutes. A one way fare is $6.75, or monthly pass can be purchased for $223.[48]

As of October 2009 the ridership levels were about three quarters of the way to MBTA projections for 2012. The current levels are about 6500 riders per day, closing in on the projections of 8,200 riders by 2012. By these measures, the rail line is an early success.[49]

It appears that the new commuter rail has had a positive effect on the roadway congestion. The number of cars per day on Route 3 between popular south shore exits 14 and 15 is down. According to the Boston Globe, "the state counted an average of 95,174 cars a day in 2006. The number was down to 92,571 in 2008."[50]

The train did not arrive without controversy. The cost of $512 million was significantly higher than similar MBTA projects. This was due to the train travelling through historic districts such as downtown Hingham. In order to satisfy local citizens the train required an expensive underpass section. Also, there were several mitigation projects to reduce noise levels and improve areas around the stations. The Greenbush area had a mitigation agreement with the MBTA worth $1.5 million that provided a sound barrier for residences and landscaped pedestrian walkways around the station. The pedestrian walkway begins in the rear of the project site.[51]

VILLAGE BUSINESS OVERLAY DISTRICT

The base zoning for the site is Business, but it is also part of a special district called the "Village Business Overlay District"[52]. This special zoning was recently

[48] Ibid.
[49] Johanna Seltz, "On track?" *The Boston Globe*, October 29, 2009: 8.
[50] Ibid.
[51] The Cecil Group, Inc. "The Greenbush Planning and Streetscape Study." 2003.
[52] Town of Scituate Massachusetts, "Zoning Bylaws." 2008, 69-83.

adopted in response to plans for the new Greenbush rail and a general need for Scituate to revitalize its village centers. The general intent of the new zoning is to implement Smart Growth and transit-oriented Development. Some of the accepted uses include residential, multifamily, apartment, consumer, professional, and commercial services. Light industrial is permitted. Hotels, showrooms, indoor sporting, and other uses are required to obtain a special permit. Building height is restricted to 3 stories or 40' and the minimum lot size is 10,000 s.f.

The land for the site is entirely in a "floodplain and watershed district". Any new structures will require a special permit and the planning board's approval. It is the opinion of the site owner that the planning board will allow a development on the land since it is in the Village Overlay District and the town clearly wants a certain type of development. At the same time, the planning board will require measures to protect the watershed district in order to obtain the special permit.[53]

The site for this study is located in one of three "villages" in Scituate. The largest is Scituate Harbor Village, followed by North Scituate Village, and the smallest is Greenbush Village. Land in these villages is targeted for smart growth. The purpose of these special village districts is to: "encourage alternative modes of transportation such as public transit, bicycling, and walking; provide for higher density mixed use and multifamily housing in village areas"[54]

Mixed use structures are allowed in the village districts, but require a special permit. The permit is granted upon meeting the planning board's requirements.

A. Pass the "*Design Review Standards*"
B. 15% of the units must be "*Affordable*"
C. The first floor along Country Way must be retail.
D. Up to 16 units per 40,000 sq. ft.
E. Up to 20 units per 40,000 sq. ft. if "*Bonus Density Requirements*" are met
    - Project area of 63,582sq. ft. allows 32 units.
F. "*Open Space*" must be 20% of lot area.

BONUS DENSITY REQUIREMENTS

The planning board will allow additional density if the developer provides improvements deemed beneficial to the village. These include sidewalks, public right of way, drainage solutions, additional open space requirements, wastewater treatment solutions, additional

[53] Town of Scituate Massachusetts, "Zoning Bylaws." 2008, 91.
[54] Ibid.

affordable units above 15%. The requirements are at the discretion of the board and may include any recommendations in the Scituate Master Plan.

PARKING REQUIREMENTS

The parking requirements for this district are different because the village is close to mass transit and people might need fewer cars. Normally, the planning board requires 1 stall per bedroom, but the reduced number for the village district is 1 stall per 1br unit, 1.5 stalls per 2 bedroom unit, and 2 stalls per 3+ bedroom unit. For commercial units, the requirement is 1 parking stall per 300 sq. ft. of commercial space. These requirements may be waived if it can be shown that adequate on street parking or "special circumstances" exist.

AFFORDABILITY STANDARDS

These standards apply to mixed use developments that have more than 7 units and the building is not registered as historic[55]. Sales price or rental amount shall be "affordable" to households with only 80% or less of the median household income for Scituate.

A. Future sales or rentals are controlled by deed restriction.
B. Affordable units must be evenly distributed among unit types.
C. Design appearance of the affordable units must be the same.
D. Comply with low income housing guidelines of the "Local Initiative Program"
    a. State run program that verifies affordability
    b. Similar guideline of affordability, providing housing for those under 80% of median income
    c. Limits all profits to developers to 20% of development costs and for rental property the limit to distribution of equity is 10%
E. 15% of units must be "affordable"

The site for this study is 66,000 square feet. That would allow a maximum of 31 units under the affordable plan. The affordability standard requires that of 15% of the units be affordable. According the chart provided, the number of affordable units in this scenario is 5. This number is easily achievable with my design because most of the have only one bedroom and easily meet affordable standards.

DESIGN REVIEW STANDARDS

The town of Scituate has a planning board of architects and engineers who oversee special permitting such as the mixed use permit for the village overlay district. In addition to enforcing the regulations of the village overlay district, they are responsible for the design standards set

[55] Ibid., 72.

forth in the Village Business overlay district. Below are the standards as laid out in the Zoning Bylaws[56].

A. Roofs.
    a. Pitched to center ridge, with minimum slope of 8:12
    b. Dormers are encouraged, but are limited to 20' wide and have no pitch requirement
    c. 20% of the roof may be flat or other design
B. Façade
    a. Awnings encouraged over 1st level commercial uses
    b. Facing public ways, glazing to be 50% of ground level and 30% of 2nd level
C. Setbacks
    a. Front setback from Country Way is minimum 5' and Maximum 10'. Parking is not allowed in front setback
    b. Side and Rear setbacks are 8'
D. Greenbush Design Standards (due to small scaled neighborhood)
    a. No structure longer than 120'
    b. Front facades no longer than 50' without articulation
E. Parking and Landscaping
    a. Driveways must be less than 24' wide
    b. Special standards apply for Water Resource Protection District
    c. On site Recharge of storm water to prevent pollution
    d. Minimization of impervious surface
    e. Landscaped front yards, no more than 25% impervious
    f. Follow MA dept of Environmental Protection Stormwater Management
    g. No invasive plants, native plants wherever possible

SCITUATE PLANNING BOARD

The planning board consists of elected officials, usually local architects and engineers. They oversee the design review standards and the details of the village overlay district. There have been two meetings with the planning board for proposed schemes for the project site in October 2005 and June 2008. In general, the planning board was receptive to the plans for high density development. But, they are very opinionated and they expect the design to follow their expectations[57]. There were at least 6 board members who have opinions about a wide range of issues. The board has concern with emergency access and traffic circulation because the site presents some challenges with its odd shape. Green space and trees are important to them and there was mention of a rooftop green space. Parking should be in boulevards with trees and not lots. They want the building envelopes to be interesting, not long and flat. Pedestrian access

[56] Town of Scituate Massachusetts, "Zoning Bylaws." 2008, 69-83.
[57] Scituate Planning Board. "Meeting Minutes." June 12, 2008. 1-3.

is also a major concern for the site. The pedestrian path that was part of the MBTA mitigation work ends behind the property. Stairs up to the Stockbridge road bridge were considered to be dangerous by the MBTA and had accessibility issues, so the path that ends behind the property should be connected to the site.

Also of high importance to the planning board was the historical character of the neighborhood. In the 2005 meeting a board member said of, "My house in Greenbush is over 300 years old. I do not think your style fits in with the historic Greenbush area. Greenbush is the oldest part of Scituate… Your design looks more like CVS than Greenbush. That is just my opinion."[58] With their distinct opinions and obvious concern, the planning board is going to be a constant concern for any designer who works on this site.

40B AFFORDABLE HOUSING

Only a small percentage, about 4.5%, of the town of Scituate's housing is considered "affordable" by the standards set by the state. The state has a requirement that at least 10% of housing be affordable to households making 80% or less of the median income. For Scituate, a 4 person household making less than $66,000 per year would qualify for affordable housing. Since only 4.5% of the housing in Scituate is affordable, and not the required 10%, a special state statute called 40b is enacted in the town.[59]

The 40b state statute was "was enacted in 1969 to help address the shortage of affordable housing statewide by reducing unnecessary barriers created by local approval processes, local zoning, and other restrictions"[60]. Essentially, as long as the project has been approved by a state agency such as the Department of Housing and Community Development and it has at least 25% affordable units, a developer can bypass local zoning standards.

Once approved by a state agency, a developer must submit an application to the Zoning Board of Appeals. The state board contacts the local planning boards, who in turn may reject the plan or require changes. According to the Citizen's housing and planning association, "the zoning board may include conditions and requirements on any aspect of the project such as height,

[58] Scituate Planning Board. "Meeting Minutes." September 22, 2005.
[59] *Town of Scituate Massachuetts - Affordable Housing Information.* http://www.town.scituate.ma.us/Affordable_Housing/ (accessed November 23, 2009).
[60] Citizens' Housing and Planning Association. "Fact Sheet on Chapter 40B The State's Affordable Housing Zoning Law." 2007. 4.

density, site plan, utility improvements, or long-term affordability--provided these conditions do not make the development economically unfeasible."[61] The developer can appeal the decisions of the zoning board if the requirements are "uneconomic".

There are a few special conditions required by 40b developments. The first is that the units deemed affordable are deed restricted and carry the affordability requirement forever. Another requirement is that the developer cannot make more than 20% profit on the entire project if it is a new sales project and no more than 10% profit per year on a rental project.

I considered this state law as an interesting opportunity to increase density, but there has been increasing resistance to 40B developments and there many unknowns involved, so an analysis of a 40B would be ambiguous and incomplete. For the most part, the 40B statute is meant to be used in areas where the zoning laws are too stringent. Fortunately, the zoning for the project site is progressive and allows for high density and mixed use due to the newly adopted "Village Overlay Business District". For the feasibility studies in the project I will be focusing on designs that are within the standards of the village overlay district.

BUILDING CODES

The state of Massachusetts has its own building code. It is based on the International Building Code (IBC 2003) with "significant Massachusetts modifications"[62] The modifications from the IBC 2003 are indicated "using ***bold and italicized print*** or in the case of entire chapters unique to Massachusetts by simply identifying such at the beginning of the chapter"[63]. The Massachusetts code will be used for this project to reference specific health and safety guidelines. In this section of my research I will give a general overview of the code requirements that may affect my conceptual design ideas.

USE AND OCCUPANCY

For this site, the most probable uses are Assembly, Business and Residential apartments. Assembly uses include Restaurants and nightclubs. The Massachusetts code separates restaurants and nightclubs as uses, their classifications are respectively, *A2r* and *A2nc*. Business

[61] Ibid., 5.
[62] William F. Gavin, *The Massachusetts State Building Code 780 CMR seventh edition.* (Boston: Secretary of the Commission, 2007), i.
[63] Ibid.

use encompasses a wide variety of professional services and is classified as *B*. Residential apartments are classified as *R2.*[64]

The site area is zoned for mixed use, and there are fire separation requirements when two types are mixed. For all the types under consideration, A2, R2, and B, there must be a two hour fire separation between the uses.

CONSTRUCTION TYPES

There are classifications of construction types between I and V. The basis of the classification is fire resistance, with I as the most fire resistant and V is the least.[65] Type III is the most common type found in the local vernacular architecture. It allows wood framing and other common combustible materials. .

HEIGHT AND AREA LIMITATIONS

The height and area allowable are dependent on both the classification of Use and Occupancy and the Construction type. I am assuming in the conceptual construction costs analysis that I will use Type III B construction because it is the most economically feasible. In this scenario, the residential apartments cannot be more than 4 stories. This is fine since the height restrictions in the local zoning law is 35 feet.

TABLE 503 ALLOWABLE HEIGHT AND BUILDING AREAS
Height limitations shown as stories and feet above grade plane.
Area limitations as determined by the definition of "Area, building," per floor.

GROUP		TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	Hgt(feet) Hgt(S)	UL	160	65	55	65	55	65	50	40
RESIDENTIAL APARTMENT										
R- 2[a, d]	S A	UL UL	11 UL	4 24,000	4 16,000	4 24,000	4 16,000	4 20,500	3 12,000	2 7,000
BUSINESS USE										
B	S A	UL UL	11 UL	5 37,500	4 23,000	5 28,500	4 19,000	5 36,000	3 18,000	2 9,000
RESTAURANT OR BAR										
A- 2	S A	UL UL	11 UL	3 15,500	2 9,500	3 14,000	2 9,500	3 15,000	2 11,500	1 6,000

Figure 21 Table of allowable height an area based on use and construction type.

The largest area per floor is 16,000 s.f. for type III B construction. For Business use, the area

[64] Ibid., 45-61.
[65] Geren, Ronald L. "Building Classification - Part 2: Construction Types." *The Code Corner*, 2006: 1-3.

restriction is 19,000 s.f. For a restaurant or bar, the restriction in area is 9,500 s.f. (figure 21)[66].

FIRE PROTECTION

Fire protection is the most important part of the building code. There are several instances in a residential mixed use building that will require fire rated construction (figure 22)[67]. Stairwells need to be smoke proof and have a 2 hour rating. Egress corridors need a 1 hour fire resistance rating[68]. Where there are different occupancy types within the same building, a firewall can be used to completely separate the building types and effectively create two separate buildings with their own height and area restrictions. Another option is to use occupancy separation in lieu of the fire wall. In this case, the building type is mixed, and a ratio of the floor area in each type is used to determine the height and area restrictions. It is possible to have two occupancy types, such as business and residential, without a fire wall or occupancy separation, however the most restrictive occupancy type will be in effect.

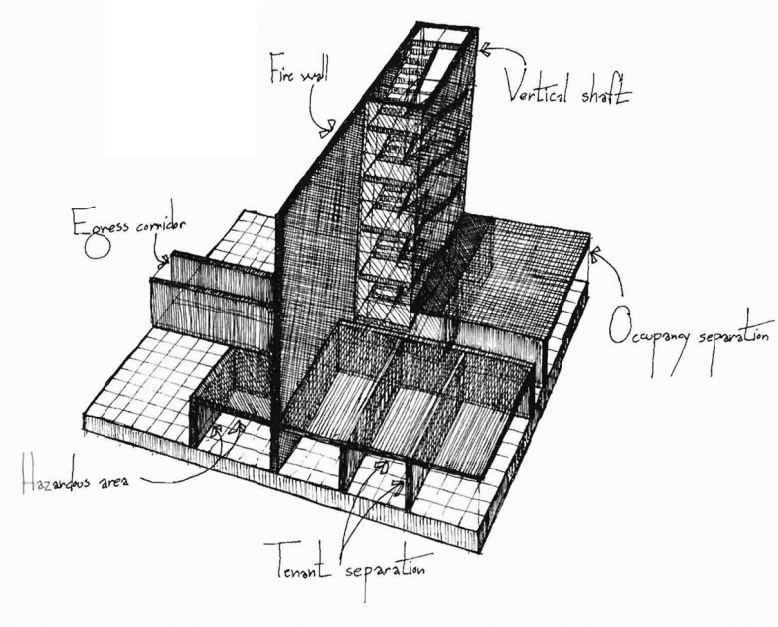


Figure 22 shows the areas of a building that normally require fire protection.

MEANS OF EGRESS

The egress requirements are based on occupancy load. According to the Massachusetts Building Code, the maximum floor area per person is 11 square feet for Assembly, 100 square feet for

[66] William F. Gavin, *The Massachusetts State Building Code 780 CMR seventh edition.* (Boston: Secretary of the Commission, 2007), 126.
[67] Scott, James G. *Architectural Building Codes A Graphic Reference.* New York: Van Nostrand Reinhold, 1997.
[68] Ibid., 143.

Business, and 200 square feet for Residential types. [69] The required width of egress routes is calculated based on the occupancy loads. A sprinkler system can lessen the required width. Enclosed exit stairwells have a minimum of 48" clearance between handrails. Two exits shall be provided if the occupancy is over 50 people per floor in Assembly and Business and if the occupancy is over 10 people per floor in Residential occupancy[70]. The residential occupancy factor is 200 s.f. per occupant, therefore a floor with over 2000 square feet will require two stairwells. The exits must be separated by a distance at least ½ of the diagonal dimension of the building. The minimum distance to an exit is 200' in all occupancy types considered. The minimum requirement can be extended to 250' if an automatic sprinkler system is used. Fire exit corridors must have a fire rating of at least ½ hour and they must have a sprinkler system if the occupancy is greater than 10 people. [71]

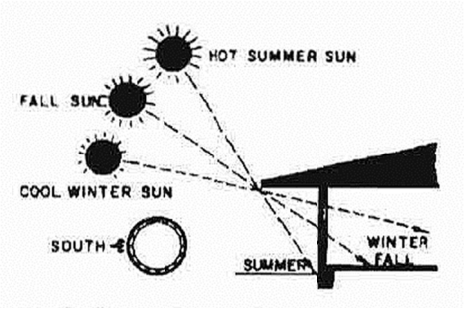
INTERIOR ENVIRONMENT

The code has several minimum requirements for interior environments. Every occupied room should be naturally ventilated. Natural lighting is also required with a minimum net glazed area of 8% of floor space. Bathrooms may be mechanically ventilated. Sound transmission between tenants is limited between walls and floors. Ceiling heights must allow at least 7' of clear space. Habitable spaces, except for kitchen must be at least 7' wide.[72]

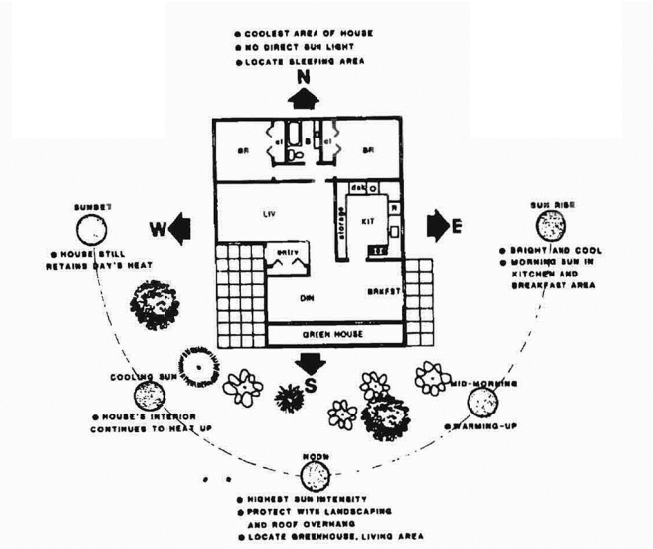
[69] William F. Gavin, *The Massachusetts State Building Code 780 CMR seventh edition.* (Boston: Secretary of the Commission, 2007), 261.
[70] Ibid., 279.
[71] Ibid., 281
[72] Ibid., 297-301.

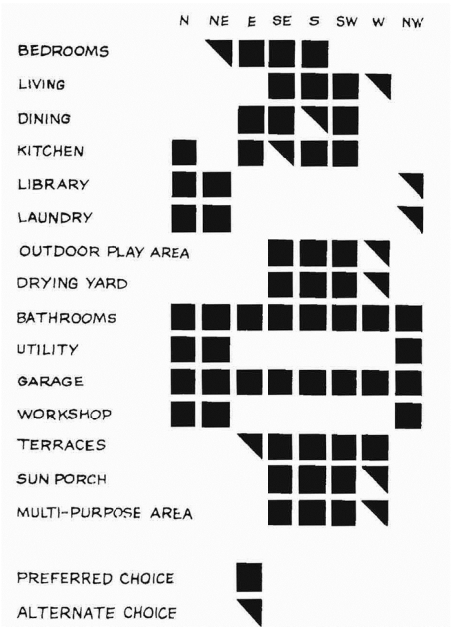
BUILDING SHAPE AND ORIENTATION

People have different desires when it comes to sunlight. According to Timesavers guide to Residential development, "people will differ in their individual choices of how a dwelling unit should be oriented, but there are some considerations that are generally accepted: 1. Each apartment should get some sun at some time of day. 2. Since people express a variety of desires as to amount and exposure to sunlight, it is advantageous for dwelling units to have different sun orientations. 3. No apartment should be oriented completely toward the north, because any dwelling unit facing north will get no sun. A south orientation is the best for obtaining the most sunlight during the day.(figures 23 & 24)"[73]



A southern orientation will allow the most sunlight. In the summers when it is hot, the sun is high in the sky,





[73] Joseph De Chiara and Julius Panero, *Timesaver Standards for Housing and Residential Development* (New York: McGraw Hill Companies, 1995), 74.

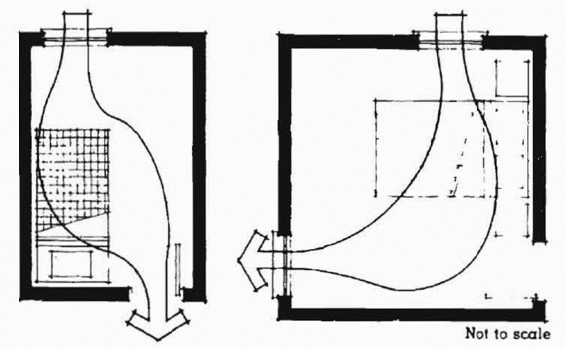
so it is easy to protect the building with overhangs or landscaping. A southern orientation is good for living spaces. An eastern orientation is generally good for sunlight. The rising sun is pleasant because the building hasn't had a chance to heat up yet. The eastern side of a building is good for spaces where people will be in the morning such as kitchens, and breakfast areas. A western orientation will receive sun in the mid to late afternoon when the building has had time to warm up and the sun is low in the sky. Sunset light can be intense and difficult to block. This is a good area for a garage or other area with few windows. A northern orientation will receive no direct sunlight. This area is the coolest and best suited for sleeping areas or areas that do not need natural light such as storage areas or garages.[74] It can be tricky to arrange all of the spaces in the appropriate orientation. Figure 25 is a good reference for layout of rooms.

According to Christopher Alexander, Author of *A Pattern Language*, buildings should be arranged into narrow "Wings of light" so that light can penetrate into all spaces. His theory is that all areas of the building should be no more than 25 feet wide so that light can penetrate deep into the spaces. The author also believes that buildings should have "light on two sides of every room". Alexander says that "rooms lit on two sides, with natural light, create less glare around people and objects; this lets us see things more intricately…in a room lit only on one side, the light gradient on the walls and floors inside the room is very steep, so that the part furthest from the window is uncomfortably dark, compared with the part near the window" A way to provide light on two sides in a large building is to have frequent corners, or "wrinkle the edge", to get the same effect. Sometimes in larger buildings it is impossible to have two walls with natural light. In these cases it is suggested to use large windows high on the wall, deep reveals, high ceilings, and white walls.[75]

In order to encourage passive cooling in the warm summers, it is suggested to orient the building's long side towards the prevailing winds. However, in a cooler climate it is more important to orient towards the sun. The climate for this site has soft summer breezes and harsh cold winter winds. Protection from winter wind is a good primary strategy in this case. Cold winter winds generally from the northwest should be protected by landscaping before the wind reaches the building. Inside the dwelling unit, the requirement for good ventilation is to

[74] Ibid., 76-77.
[75] Christopher Alexander, Sara Ishikawa, and Murray Silverstein. *A Pattern Language: Towns, Buildings, Construction* (New York: Oxford University Press, 1977), 526,728.

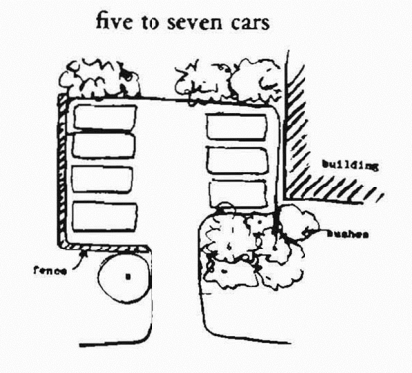
have windows far apart and on opposite walls (Figure 26).[76] This recommendation happens to work well with the suggestion by Christopher Alexander to having light from at least two walls. The concepts behind good ventilation and good lighting can work together nicely.



SITE PEDESTRIAN CIRCULATION

Pedestrians should be accommodated by a convenient network of paths. The pathways should be direct, convenient, and safe. If the path is not direct, people have a tendency to take shortcuts across landscaping. Pathways should also be flat, without stairs, to accommodate wheelchairs. There should be a hierarchy of paths, with the widest paths at the most heavily trafficked areas and there should also be separate path for the rear of the building. "The quality of a multifamily dwelling appears to decrease when one entrance has to accommodate the removal of garbage and the entrance of guests."[77] Pedestrian traffic is especially important for the project site because there is a public pathway behind the site that comes to a dead end. The site design should connect to this pathway.

VEHICLES



Vehicles should not interfere with the circulation of pedestrian. According to Timesaver Standards, "Vehicles should be able to approach residential buildings, but need not remain there and conflict with pedestrian movement. The ideal solution seems to be the vertical separation of pedestrians and vehicles. However, this type of separation is generally limited to central city locations where heavy traffic volume justifies the great expense." The walking distance to parking should not be more than 100 feet and never more than 200 feet.[78]

Parking is a detriment to any site plan. The large paved surfaces are unsightly and can become

[76] Joseph De Chiara and Julius Panero, *Timesaver Standards for Housing and Residential Development* (New York: McGraw Hill Companies, 1995), 74.
[77] Ibid., 85
[78] Ibid.

heat islands in the summer. It is advisable to reduce parking requirements wherever possible when public transportation is nearby. Several small parking areas are preferable to one or two large lots. Driveways should have two traffic lanes, usually a minimum of 18'.[79]

According to author Christopher Alexander in A Pattern Language, parking should be "small, serving no more than five to seven cars, each lot surrounded by garden walls, hedges, fences, slopes, and trees, so that from the outside the cars are almost invisible. Space these small lots so that they are at least 100 feet apart." (Figure 27)[80]

The standard dimension of a parking stall that is angled at 90 degrees is 8.5 feet wide by 18 feet long. This is the most efficient use of space. Angled stalls are more convenient to drivers, but when the stall is angled, they end up taking up more distance along the curb.[81] (Figure 28)

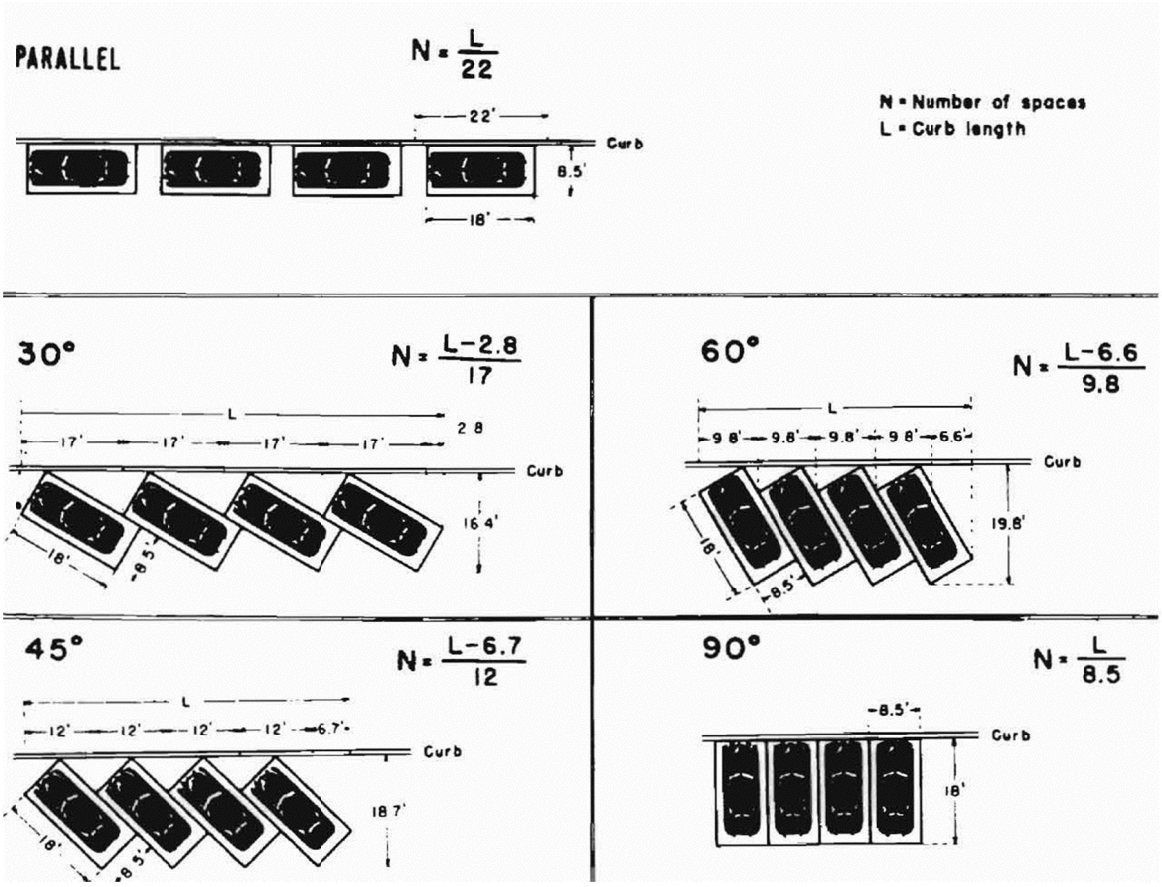


Figure 28 standard parking layout dimensions

[79] Ibid., 94-95.
[80] Christopher Alexander, Sara Ishikawa, and Murray Silverstein. *A Pattern Language: Towns, Buildings, Construction* (New York: Oxford University Press, 1977), 526,728
[81] Ibid., 96.

NOISE CONTROL

The project site is located adjacent to a railway, so the issue of noise control is a sensitive one. According to Timesaver Standards of Residential Development, noise control is a difficult issue and the best option is to choose a quiet site. Since that isn't an option, there are some ways to mitigate the sound. The most effective methods are a high wall or an earth berm. (Figure 29)[82]

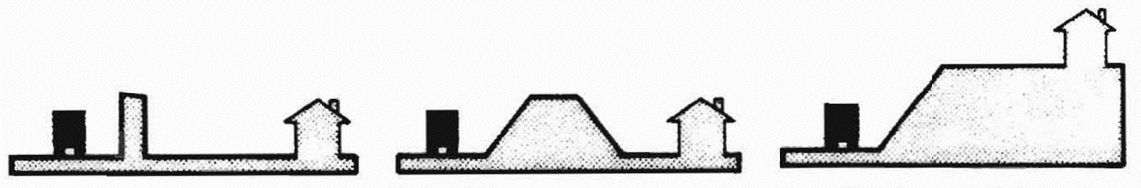


Figure 29 diagram showing a wall or earth berm as noise protection

One way of mitigating sound is through the functional layout of the building. Walls facing the noise source can be heavy and windowless. The uses of the rooms near the noise source should be less sensitive to noise. Building orientation can also have an effect on noise transmission. Closely parallel buildings will reverberate sound and make it worse. Convex curves tend to buffer sound well. Staggering of buildings is another way of avoiding reverberations. The diagram below depicts good and poor methods of noise control through building layout. (Figure 30)[83] Where there is no wall or berm to block noise, the building itself can be used to stop noise. For the project site, this may be a good solution to noise. Part of the building will need to be sacrificed in order to block the noise. If the rooms facing the noise are not as sensitive, this method might work.

Trees can be helpful in mitigating sound if the other methods aren't available. The trees need to be thick and leafy with several rows. "A single row of trees is worthless as a noise barrier". Only a thick growth will help. Noise can be reduced about 6-7 db per 100 ft of thick growth.[84]

[82] Ibid., 105
[83] Ibid., 108.
[84] Ibid., 106-108.

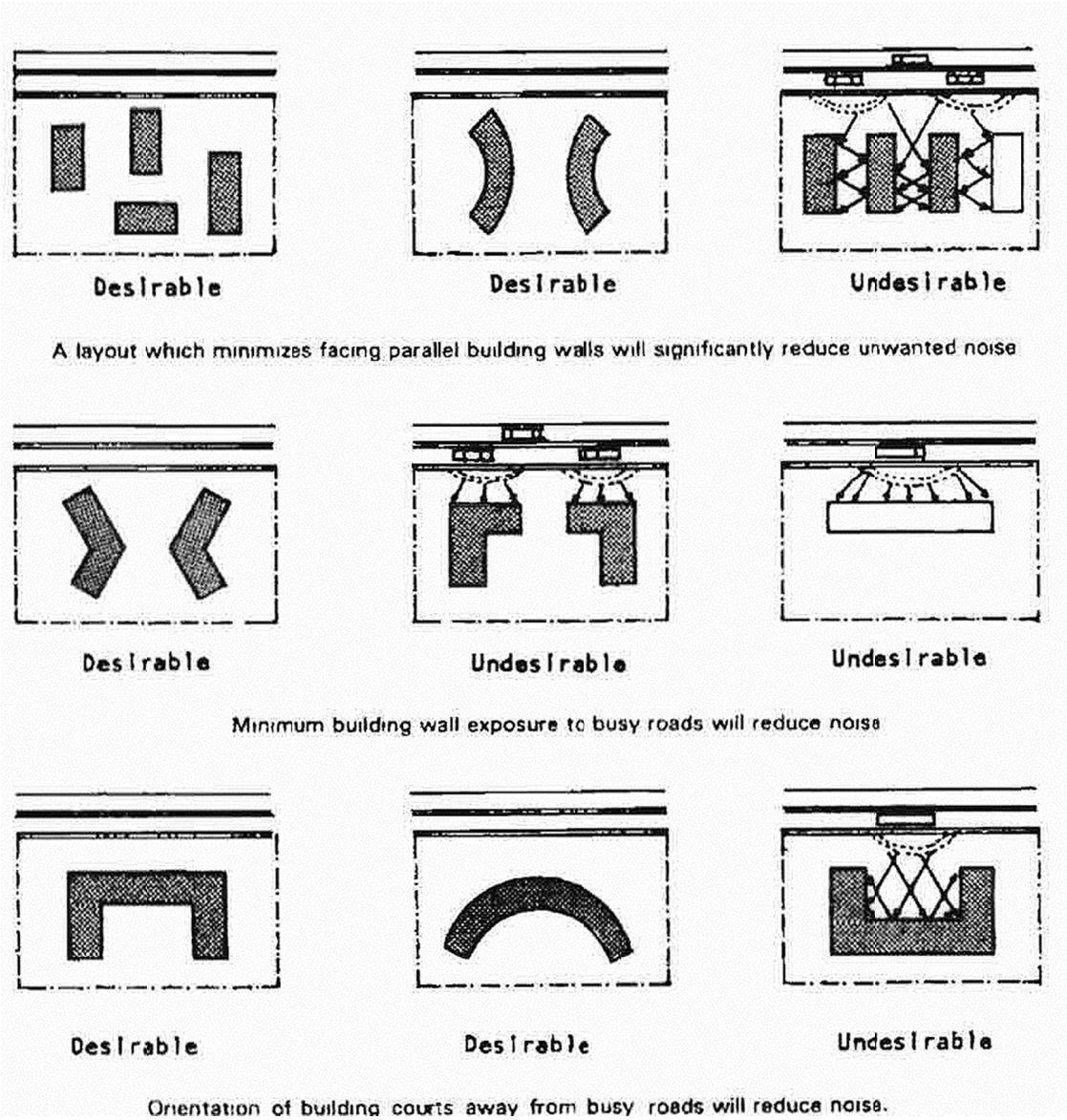
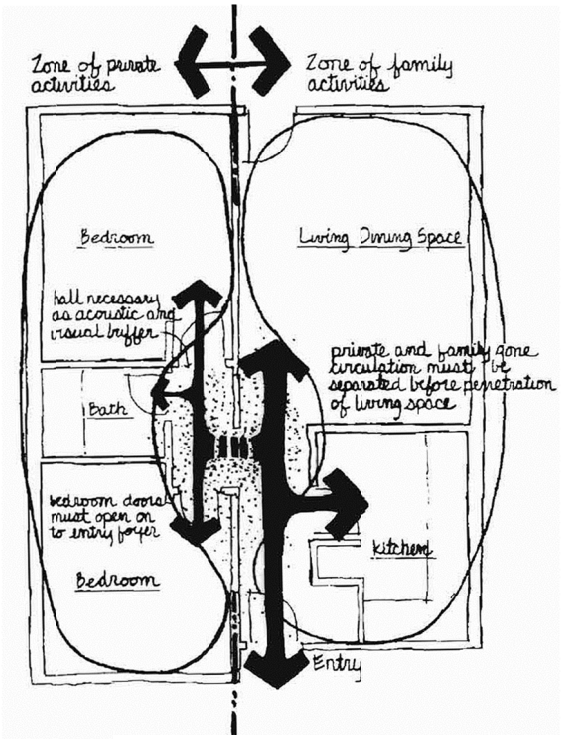


Figure 30 The arrangement of buildings can have an effect on the overall noise levels.

INTERIOR LAYOUT

TABLE 1 Typical Room Sizes (ft)

	Small	Average	Large
Basic Rooms			
Living room	12 × 18	16 × 20	22 × 28
Dining room	10 × 12	12 × 15	15 × 18
Kitchen	8 × 10	10 × 16	12 × 20
Utility room	6 × 7	6 × 10	8 × 12
Bedroom	10 × 10	12 × 12	14 × 16
Bathroom	5 × 7	7 × 9	9 × 12
Additional Rooms/Areas			
Halls	3' wide	3' 6" wide	3' 9" wide
Area	10 × 20	20 × 20	22 × 25
Storage wall	6" deep	12" deep	18" deep
Den	8 × 10	10 × 12	12 × 16
Family room	12 × 15	15 × 18	15 × 22
Wardrobe closet	2 × 4	2 × 8	2 × 15
One-rod walk-in closet	4 × 3	4 × 6	4 × 8
Two-rod walk-in closet	5 × 4	6 × 6	6 × 8
Porch	5 × 8	8 × 12	12 × 20
Entry	6 × 6	8 × 10	8 × 15
One-car garage	11 × 19	13 × 25	16 × 25
Two-car garage	20 × 20	22 × 22	25 × 25



Dwelling units come in all shapes and sizes. There is no one way to design a dwelling, but it is important to follow some basic guidelines for interior layout. First, there should be some separation of space. Private activities should be separated from family activities. This can be easily accomplished with a two level dwelling with family activities on the first floor and private activities on the second. For this project, however the most likely scenario is that each dwelling will be on a single floor. In this case it is important to provide some horizontal zoning that separates private from non private. This can be achieved by a secondary hall for private spaces as in figure 31.[85]

According to Timesaver Standards for Residential Development, there are some rules for the functional organizing of rooms. Kitchens should be near the entry. It shouldn't be necessary to

[85] Joseph De Chiara and Julius Panero, *Timesaver Standards for Housing and Residential Development* (New York: McGraw Hill Companies, 1995), 273.

go through a dining area or living room to reach the kitchen. Also, a kitchen should be accessed from a bedroom without going through the living space, if possible. Dining spaces should be adjacent to or have direct access to the kitchen. Dining rooms can be combined with living rooms, but should not impair circulation. In smaller dwellings, dining areas can be combined with the kitchen effectively. Living rooms should have direct access to the entry and stairs without going through other rooms. Living rooms should also have access to any private outdoor space. Bathrooms should be conveniently accessible without going through another bedroom (except in the case where there are two bathrooms on the floor and one is in a master suite). A bathroom should never open up directly to a living dining or kitchen area. A hallway is a good place for a bathroom.[86]

There are many variations of room sizes or combinations of rooms that can work for an interior layout. Timesavers guide has a convenient table that gives typical room sizes for small, average and large homes (Figure 32). The smallest sizes in these tables will accommodate the minimum standard furniture.

[86] Ibid., 275.

RESEARCH DOCUMENTATION

As was shown in the background section, a financial analysis is only as good as the numbers that go into it. Therefore, the aim for this research is to find current, relevant and accurate financial data. The data I am looking for are; long term trends in housing prices, local sales and rental prices for condos similar to my design, conceptual square foot construction costs, all soft costs related to construction, financing costs and tax implications.

MARKET ANALYSIS (INCOME POTENTIAL)

In this section I will try to find market trends for condos for sale, apartments for lease, and office/retail for lease. The focus area for the market study is the south shore of Massachusetts, particularly the towns of Cohasset, Hingham and Scituate.

RESIDENTIAL CONDOMINIUM MARKET TRENDS

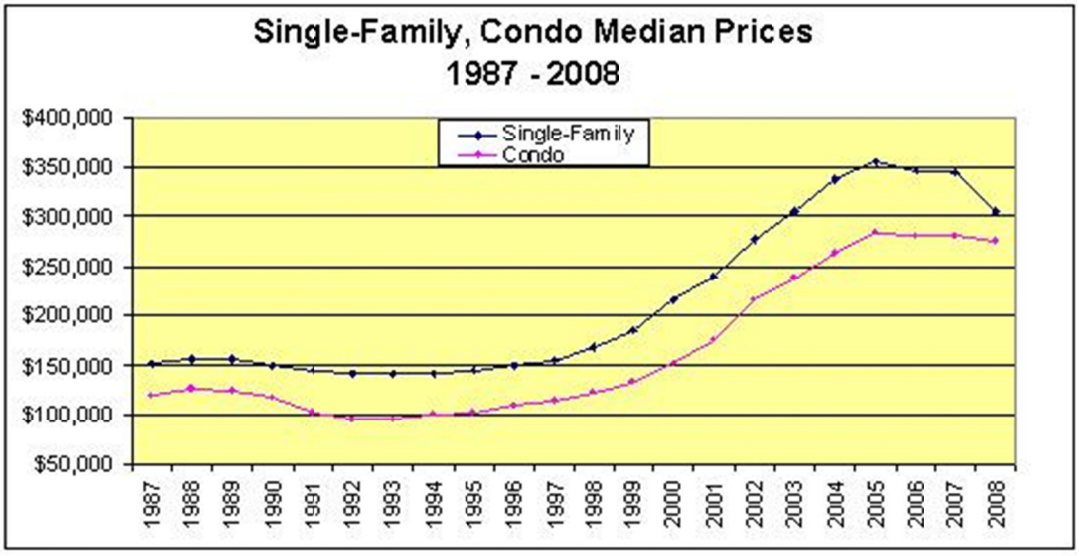


Figure 33 Housing market trends for New England area

The overall condo sales market for the past 2 decades has seen rising in prices (figure 33)[87]. Between 1987 and 2008, median condo prices for the New England area covered by the Warren Group (MA, CT, RI, NH, ME) have more than doubled. Most of the growth has taken place between 1997 and 2005. In the past three years, however, median prices have been dropping sharply in response to the nationwide issues with the lending standards.

[87] The Warren Group. *Statistics.* http://www.thewarrengroup.com/portal/PressRoom/Statistics (accessed November 17, 2009).

The downward trend of condo prices has been happening for about four years in the area. But, it appears that that trend is beginning to reverse. The sales volume and median prices are up for the third quarter of 2009 compared to Q3 2008. The inventory is also shrinking. According to the Massachusetts Association of Realtors, "The September condominium market was up 12.2 percent compared to the same time last year (from 1,300 units sold in 2008 to 1,459 units sold in 2009). Condominium median selling prices in September were up 1.7 percent from $255,000 in 2008 to $259,450 in 2009. The condominium market saw September inventory decrease by 16 percent from last year (13,841 listings in 2008 to 11,637 listings in 2009), which translates into 6.7 months of supply, which is down from 10.6 months in September 2008"[88] This is a promising trend for condominium sales in the future. For the feasibility analysis, I will assume that condo sale prices in the next 5 years will increase at 2% year for inflation.

It appears that while the condo sales market has been struggling, the rentals market has been picking up. According to the Boston Globe, "The Greater Boston Housing Report Card 2009 shows renters in the region pay an average of $1,629 a month, 11 percent more than four years ago, even though housing values dropped about 18 percent during the same period. Barry Bluestone, the report's coauthor, attributed the increase to a growing demand for rentals, as people who lost their houses to foreclosure have moved into apartments, and to a high number of qualified buyers who remain content to rent until the economy stabilizes"[89] For feasibility forecasting purposes I am going to assume a 2% inflation rate on rental rates.

COMPARABLE SALES DATA

While the macro data is a good way to get a sense of the general market, in order to gain a true sense of the market for condos in the Greenbush area, data from the surrounding towns is far more accurate. The towns of Cohasset, Hingham and Scituate are a good reference point for housing data and this area will be the basis for the market study of condos. In this area most people live in single family homes and condo market in Scituate is relatively small. For my more accurate data, I am expanding the search zone to include the surrounding towns of Cohasset and Hingham so that there is a larger pool of data to draw from.

[88] Massachusetts Association of Realtors. "Press Release Q3-2009." Quarterly Report, Wrentham, MA, 2009.
[89] Jennifer B McKim, "Renters get little relief as demand increases." *The Boston Globe*, October 27, 2009, 43.

There are four developments that I consider to be the closest comparable residential condos. All of the developments have been built within the past 5 years. The first is 91 Front street in Scituate harbor. This mixed use development is about 2 miles from Greenbush. There is no train stop here, but it is a vibrant area of mixed-use buildings. This condo is mostly residential with a few stores at the street level. It was built in 2006 and the construction is steel framed.

91 Front St - Unit 310
Scituate, MA 02066-1315
Condo

MLS #: **70952757**	Status: **Sold**
List Price: **$750,000**	Sale Price: **$625,000**
List Date: **7/27/2009**	Sale Date: **8/31/2010**
Area:	Off Market Date: **8/17/2010**
Days on Market (Total): **386**	Days on Market (Office): **386**

Property Features

Rooms: **5**	Style: **Mid-Rise**
Bedrooms: **2**	Type: **Condo**
Full Bath: **2**	Apprx Acres: **0**
Half Bath: **0**	Apprx Lot Size: **0 sq.ft.**
Master Bath: **Yes**	Apprx Living Area: **1693 sq.ft. ($369.17/sq.ft.)**
Fireplaces: **1**	Garage: **2 Under, Heated, Deeded**
Year Built: **2006**	Parking: **2 Off-Street, Assigned, Deeded**
No. Units: **35**	Unit Level **1** Placement: **Top/Penthouse**
Association: **Yes**	Fee: **$616**

Fee Includes: **Master Insurance, Elevator, Exterior Maintenance, Road Maintenance, Landscaping, Snow Removal, Extra Storage, Refuse Removal**

60 New Driftway - Unit 4
Scituate, MA 02066
Condo

MLS #: **70871641**	Status: **Sold**
List Price: **$499,000**	Sale Price: **$499,000**
List Date: **2/3/2009**	Sale Date: **10/27/2009**
Area: **Greenbush**	Off Market Date: **8/17/2009**
Days on Market (Total): **561**	Days on Market (Office): **195**

Property Features

Rooms: **7**	Style: **Townhouse**
Bedrooms: **3**	Type: **Condo**
Full Bath: **3**	Apprx Acres:
Half Bath: **0**	Apprx Lot Size: **sq.ft.**
Master Bath: **Yes**	Apprx Living Area: **2397 sq.ft. ($208.18/sq.ft.)**
Fireplaces: **1**	Garage: **2 Attached, Under**
Year Built: **2008**	Parking: **1 Guest**
No. Units: **26**	Unit Level **1** Placement: —
Association: **Yes**	Fee: **$301**

Fee Includes: **Master Insurance, Exterior Maintenance, Road Maintenance, Landscaping, Snow Removal, Refuse Removal**

132 Chief Justice Cushing Hwy - Unit 204
Cohasset, MA 02025
Rental

MLS #: **71076905**	Status: **Rented**
List Price: **$1,660**	Rented Price: **$1,660**
List Date: **5/7/2010**	Rental Date: **8/1/2010**
Area:	Off Market Date: **7/1/2010**
Days on Market (Total): **55**	Days on Market (Office): **55**

Property Features

Rooms: **5**	Type: **Apartment**
Bedrooms: **1**	Deposit Reqd: **Yes $1660**
Full Bath: **2**	Last Mon Rent: **No** First Mon Rent: **Yes**
Half Bath: **0**	Parking Spaces: **1**
Master Bath: **Yes**	Unit Level: **2**
Fireplaces: **1**	References Reqd: **No**

Apprx Living Area: **1387 sq.ft.**

100 Station Lndg - Unit 209
Medford, MA 02155-5154
Rental

MLS #: **71146046**	Status: **Rented**
List Price: **$1,675**	Rented Price: **$1,675**
List Date: **10/4/2010**	Rental Date: **10/26/2010**
Area: **Wellington**	Off Market Date: **10/19/2010**
Days on Market (Total): **15**	Days on Market (Office): **15**

Property Features

Rooms: **3**	Type: **Condominium**
Bedrooms: **1**	Deposit Reqd: **Yes** **$1675**
Full Bath: **1**	Last Mon Rent: **No** First Mon Rent:
Half Bath: **0**	Parking Spaces: **1**
Master Bath: **No**	Unit Level: **2**
Fireplaces: **0**	References Reqd: **Yes**
Apprx Living Area: **791 sq.ft.**	

Another close comparable is development is 60 New Driftway in Scituate. This residential development consists of attached townhouses and is only ½ mile from the project site. Another Development, 132 Chief Justice Cushing Highway, Old Colony Square, is a mixed use TOD located 2 stops north of the Greenbush. This property is probably the closest comparable in terms of TOD. The construction quality is high. The developer has only offered rentals, not sales. 100 Station Landing in Medford is a high rise TOD a few miles away that has smaller 1 bedroom units similar to my design. (Figure 34)[90] These developments and others in within the surrounding area are the basis for the market analysis.

APARTMENT RENTALS AND SALES MARKETS

I am interested in finding average sale and rental prices for 1 bedroom, 2 bedroom and 3 bedroom units because I have each of these condo types in my design. These numbers will provide income projections for the pro-forma cash flow analysis. The following charts show the most recent sales and rental data for condos near the project site. The condos in the charts were all sold in the 6 months between June and November of 2010, are in newer developments, were built in the past 5 years, and are located in the local area. The data is used to find average rent/square foot/month for rentals and average sale price/square foot for condo sales that can be used to forecast income in the pro-forma analysis. (Figure 35)[91]

[90] MLS Property Information Network. *H3MLS.* http://www.mlspin.com/mlspin/index.html (accessed November 17, 2009).
[91] Ibid.

ONE BEDROOM RENTALS							
STREET_NO	STREET_NAME	UNIT_NO	TOWN	NO_BEDROOMS	SQUARE_FEET	RENTAL_PRICE	PRICE_PER_SQFT
132	Chief Justice Cushing Hwy	203	Cohasset, MA	1	1387	1560	1.12
132	Chief Justice Cushing Hwy	207	Cohasset, MA	1	1502	1700	1.13
132	Chief Justice Cushing Hwy	202	Cohasset, MA	1	1351	1660	1.23
132	Chief Justice Cushing Hwy	204	Cohasset, MA	1	1387	1660	1.2
132	Chief Justice Cushing Hwy	201	Cohasset, MA	1	1351	1600	1.18
100	Station Lndg	209	Medford, MA	1	791	1675	2.12
				Average rent/square foot/month			1.35

TWO BEDROOM RENTALS							
STREET_NO	STREET_NAME	UNIT_NO	TOWN	NO_BEDROOMS	SQUARE_FEET	RENTAL_PRICE	PRICE_PER_SQFT
45	Hancock Street	402	Quincy, MA	2	1184	1850	1.56
132	Chief Justice Cushing Hwy	205	Cohasset, MA	2	1576	1800	1.14
132	Chief Justice Cushing Hwy	208	Cohasset, MA	2	1604	1800	1.12
132	Chief Justice Cushing Hwy	212	Cohasset, MA	2	1633	1950	1.19
132	Chief Justice Cushing Hwy	215	Cohasset, MA	2	1665	2110	1.27
132	Chief Justice Cushing Hwy	206	Cohasset, MA	2	1576	1800	1.14
132	Chief Justice Cushing Hwy	210	Cohasset, MA	2	1604	1850	1.15
132	Chief Justice Cushing Hwy	214	Cohasset, MA	2	1633	1850	1.13
132	Chief Justice Cushing Hwy	211	Cohasset, MA	2	1604	1950	1.22
132	Chief Justice Cushing Hwy	213	Cohasset, MA	2	1604	1950	1.22
132	Chief Justice Cushing Hwy	216	Cohasset, MA	2	1665	2100	1.26
106	Washington Street	0	Quincy, MA	2	1268	1800	1.42
74	Walker St	1	Quincy, MA	2	1000	1550	1.55
56	Penn Street	1	Quincy, MA	2	1516	2200	1.45
614	Pond Street	1-216	Braintree, MA	2	1109	1500	1.35
100	Stations Landing	204	Medford, MA	2	1122	2000	1.78
109	California Ave	304	Quincy, MA	2	900	1425	1.58
				Average price/square foot/month			1.33

THREE BEDROOM RENTALS							
STREET_NO	STREET_NAME	UNIT_NO	TOWN	NO_BEDROOMS	SQUARE_FEET	RENTAL_PRICE	PRICE_PER_SQFT
2	amaranth place	2	Medford, MA	3	2900	2600	0.9
210	Neponset St	210	Canton, MA	3	1800	2300	1.28
				Average Rental Price/s.f./mo			1.18

ONE BEDROOM SALES							
STREET_NO	STREET_NAME	UNIT_NO	TOWN	NO_BEDROOMS	SQUARE_FEET	SALE_PRICE	PRICE_PER_SQFT
120	Holmes St	202E	Quincy, MA	1	835	228000	273.05
614	Pond Street	2108	Braintree, MA	1	730	155000	212.33
1000	Davenport	101	Canton, MA	1	898	235000	261.69
100	Station Landing	1003	Medford, MA	1	976	410000	420.08
2301	Davenport	301	Canton, MA	1	1081	262500	242.83
91	Front Street	209	Scituate, MA	1	1012	269000	265.81
91	Front St	308	Scituate, MA	1	875	295000	337.14
2000	Davenport	201	Canton, MA	1	1081	265000	245.14
				Average sale price/square foot			282

TWO BEDROOM CONDO SALES							
STREET_NO	STREET_NAME	UNIT_NO	TOWN	NO_BEDROOMS	SQUARE_FEET	SALE_PRICE	PRICE_PER_SQFT
120	Holmes	212E	Quincy, MA	2	1441	330000	229.01
118	Holmes	301W	Quincy, MA	2	1342	327000	243.67
118	Holmes	403W	Quincy, MA	2	1175	330000	280.85
118	Holmes	404W	Quincy, MA	2	1045	334000	319.62
27	Turtle Brook Road	A	Canton, MA	2	1201	299000	248.96
501	Commerce Drive	2-108	Braintree, MA	2	1070	235000	219.63
60	New Driftway	7	Scituate, MA	2	1973	515000	261.02
620	Hampton Way	620	Abington, MA	2	1592	299550	188.16
11	Brookside Rd.	10	Braintree, MA	2	1418	286000	201.69
91	Front St	310	Scituate, MA	2	1693	625000	369.17
215	Harvard Street	6	Medford, MA	2	1375	370000	269.09
106	Washington Street	23	Quincy, MA	2	1562	415000	265.69
2	Hudson Street 2B	2B	Quincy, MA	2	1673	347500	207.71
44	Turtle Brook Road	Type A	Canton, MA	2	1200	340000	283.33
39-7	Hayward St	7	Braintree, MA	2	1800	377777	209.88
917	Hampton Way	917	Abington, MA	2	2216	323000	145.76
45	Hancock St	104	Quincy, MA	2	1070	302500	282.71
120	Holmes St	109	Quincy, MA	2	1327	275000	207.23
1000	Davenport	307	Canton, MA	2	1256	340000	270.7
100	Station Lndg	601	Medford, MA	2	1223	453000	370.4
1000	Davenport	308	Canton, MA	2	1256	334900	266.64
1000	Davenport	302	Canton, MA	2	1256	330000	262.74
1000	Davenport	304	Canton, MA	2	1051	299900	285.35
79-81	suomi	79a	Quincy, MA	2	895	247500	276.54
1000	Davenport	202	Canton, MA	2	1256	330000	262.74
79-81	Suomi road	79b	Quincy, MA	2	918	250000	272.33
155	Kendrick Ave.	502	Quincy, MA	2	1628	276000	169.53
907	Hampton Way	907	Abington, MA	2	2216	308195	139.08
580	Quarry	16	Quincy, MA	2	1275	380000	298.04
580	Quarry	18	Quincy, MA	2	1275	385000	301.96
2000	Davenport	207	Canton, MA	2	1256	332500	264.73
7	Kyle Path	8	Scituate, MA	2	2400	455000	189.58
12	Alexander Place	37	Scituate, MA	2	2650	470000	177.36
1701	Hampton Way	1701	Abington, MA	2	2090	337000	161.24
2000	Davenport	302	Canton, MA	2	1256	315000	250.8
60	INDIAN WOODS WAY	60	Canton, MA	2	2651	465000	175.41
21	ROCKLAND ST	Q	Canton, MA	2	1557	360000	231.21
13	Irving Street	13	Medford, MA	2	1757	375000	213.43
21	ROCKLAND ST	P	Canton, MA	2	1557	365000	234.43
21	ROCKLAND ST	A	Canton, MA	2	1557	365000	234.43
416	John Mahar Highway	3301	Braintree, MA	2	2428	500000	205.93
416	John Mahar Highway	3106	Braintree, MA	2	2349	464900	197.91
21	ROCKLAND ST	L	Canton, MA	2	1417	352000	248.41
606	Hampton Way	606	Abington, MA	2	1592	317000	199.12
100	station landing	302	Medford, MA	2	1264	433000	342.56
1901	Hampton Way	1901	Abington, MA	2	2090	346985	166.02
1507	Hampton Way	1507	Abington, MA	2	1592	321863	202.18
416	John Mahar Highway	3405	Braintree, MA	2	2667	534900	200.56
				Average price per sqare foot			240

Figure 35 Charts of condo sales and rentals data of comparable developments

THREE BEDROOM CONDO SALES							
STREET_NO	STREET_NAME	UNIT_NO	TOWN	NO_BEDROOMS	SQUARE_FEET	SALE_PRICE	PRICE_PER_SQFT
614	Hampton Way	614	Abington, MA	3	2090	330000	157.89
60	New Driftway	2	Scituate, MA	3	2391	600000	250.94
60	New Driftway	5	Scituate, MA	3	2368	545000	230.15
75	Brackett Street	A	Quincy, MA	3	1750	366000	209.14
341	First Parish Rd	0	Scituate, MA	3	2700	570000	211.11
60	New Driftway	6	Scituate, MA	3	2391	600000	250.94
75	Brackett Street	H	Quincy, MA	3	1750	370000	211.43
75	Brackett Street	F	Quincy, MA	3	1750	355000	202.86
8	Newport Terrace	1	Quincy, MA	3	1429	373000	261.02
151	Jerome St.	151	Medford, MA	3	2241	445000	198.57
153	Jerome St.	153	Medford, MA	3	2241	449500	200.58
1	Prospect Hill St	1	Quincy, MA	3	1690	340000	201.18
248	Presidents Lane	C	Quincy, MA	3	2400	420000	175
385	beale Street	2	Quincy, MA	3	1680	410000	244.05
27	Sanger St.	1	Medford, MA	3	2040	429200	210.39
							214.35

The tables show that the two bedroom market has the most transactions and will have the fastest sales rate. But, the one bedroom market has a greater return per square foot for both rentals and sales. There are fewer 1 and 3 bedroom units on the market. The reason is likely that two bedrooms are historically the most popular type of condo and there are simply fewer 1 and 3 bedroom units available.

In my opinion the 1 bedroom units seem to offer the development an advantage. The market trends are shifting towards smaller more affordable units and there aren't very many on the market. I was a property manager in this area for several years, and from my experience, 1 bedroom units are easier to rent out than 2 bedroom units. They also tend to be easier to manage as there is usually only one contact person and one person responsible to pay the rent.

Elaine Cole is a local real estate professional who has been working in the Scituate real estate market for over a decade. She agreed to answer a few questions about the real estate market in the Scituate area. According to Elaine, there has been a noticeable influx of people moving into the area for the train. These people are mainly in their 30's and are looking for an easier commute into the city. She thinks that there could be a good market for affordable housing, especially under $250,000. She says that the more expensive condos are harder to sell. She thinks that the market can absorb about 25 condos per year at the current sales rates. However, there are very few offerings under $250,000 and this could be an underutilized area of the market. She says of the lower end of the market, "There could be a market for affordable units, particularly in the Greenbush commercial area. Right now there is very little affordable

living in Scituate especially at this price point. …maybe they would sell quicker as there is only 1 unit for sale under $250K and 1 sold under $250K (in the past year)."[92]

MARKET FOR COMMERCIAL LEASING

Commercial leasing is not a big business in the South Shore of Massachusetts. It's primarily a bedroom community with small mom and pop stores. When I searched for comparable properties on the MLS, there were only twelve properties offered for lease that could be considered comparable to the commercial component envisioned for 50 Country Way in Greenbush. The average price per s.f. is $1.62 per month. (figure 36)[93] It should be clarified that the prices for leases, both commercial and residential are only asking prices and the prices are likely to be negotiated down about 5-10% from the asking prices. When applying these numbers to the feasibility analysis I will adjust the number accordingly.

STREET_NO	STREET_NAME	UNIT_NO	TOWN	SQUARE_FEET	LIST_PRICE	PRICE PER S.F.
259	Stockbridge Road	3 & 4	Scituate, MA	322	425	$ 1.32
42 A	North St		Hingham, MA	850	900	$ 1.06
42 B	North St		Hingham, MA	450	900	$ 2.00
760	Chief Justice Cushing Hwy		Cohasset, MA	450	850	$ 1.89
1	Pleasant Street	6a	Cohasset, MA	240	450	$ 1.88
4-A	Brook Street		Scituate, MA	1800	1200	$ 0.67
226	Chief Justice Cushing Hwy		Cohasset, MA	1760	2000	$ 1.14
62	Derby St.	14	Hingham, MA	1578	2630	$ 1.67
84	North St		Hingham, MA	920	1600	$ 1.74
59R	Rockland St.		Hingham, MA	360	700	$ 1.94
827	Chief Justice Cushing Highway		Cohasset, MA	2000	3500	$ 1.75
1	Pleasant Street	9A	Cohasset, MA	168	400	$ 2.38
				AVERAGE PRICE PER S.F.		$ 1.62

Figure 36 Commercial property for lease.

According to local Realtor Elaine Cole, commercial leasing at the project site does not hold great promise. "50 Country way appears to be in the heart of commercial property with a small mix or residential thrown in…so you would think that this would work well however, commercial leasing seems to be really tough right now. The Welch company old building right in the heart of Front street has been renovated and ready for occupancy but continues to stay empty as the fees are either too high or there isn't a demand. It's a shame as we could do with a few more shops etc. there as it may attract more people to the town."[94] For my design I have chosen to use only one small commercial unit at the street front where there will be plenty of traffic. Due to the success of the neighboring businesses, I believe this is a feasible option for the site and a

[92] Cole, Elaine, interview by Paul Ford. *Coldwell Banker Realtor* (December 2, 2009).
[93] Ibid.
[94] Cole, Elaine, interview by Paul Ford. *Coldwell Banker Realtor* (December 2, 2009).

commercial unit facing the street is the most appropriate for the neighborhood and a TOD.

COMMERCIAL CONDO SALES

Sales of commercial properties in the area are somewhat rare. There was only one sale in the past six months. The property is located in Cohasset Village. It is actually an Old Colony Railroad building that was converted to office. I worked next door to this building for several years and am familiar with it. The property sold for an amazingly low price of $175,000 for 2743 square feet (figure 37)[95]. This is a dismal $64 per square feet.

Figure 3 7 A 2743 s.f. commercial condo sold for only $175k

For the feasibility analysis in this project, I will not be using commercial condo sales as a potential development due to a clear lack of demand.

[95] MLS Property Information Network. *H3MLS.* http://www.mlspin.com/mlspin/index.html (accessed November 17, 2009).

COST ANALYSIS

The purpose of this of research is to determine the cost figures that will be used in the feasibility analysis.

LAND COSTS

The value of raw developable land is difficult to pinpoint, especially when the zoning is unusual and the market is unpredictable. Unlike values of condos, which are relatively easy to valuate, there are no recent sales of land to compare to the project site. The village overlay district is a new type of zoning in this area and there are no past sales to accurately compare it to. In this situation I am left with only the tax assessed value as reliable information. The assessed value for the land at 50 Country Way is approximately $260,000 per acre[96]. The site is approximately 1.5 acres.

The owner of the site has been in negotiations with potential developers for the purchase of the land[97]. The land owner wanted $1.5 million for 1.5 acres, or $1 Million per acre. This price is likely too high as the developer eventually backed out of the negotiations due to feasibility issues.

There was a sale of TOD zoned land in Cohasset that did not go through the realtor's MLS system, but there were some public settlements with land owners near the Cohasset train station that may help determine land value. The MBTA used eminent domain to acquire property adjacent to the MBTA's Cohasset train station. This is an area that is now zoned for transit-oriented development. The MBTA was ordered to pay $1.95 Million dollars for a parcel with 3.67 acres of developable land. Originally the MBTA paid only the appraised value of $620,000[98] The MBTA ended up paying 3x what the appraiser thought it was worth. This illustrates the difficulty of raw land valuations, and also gives some insight into values for TOD zoned land.

For this project, I will use this court judgment as the basis for land value as they likely had plenty of evidence to back it up. Therefore, the land value that will be used in the following feasibility studies will be $531,000 per acre.

[96] Ibid.
[97] Ford, Chris, interview by Paul Ford. *Owner of 50 Country Way* (December 1, 2009).
[98] Nancy White, "MBTA pays $1.95M for land." *The Cohasset Mariner*, May 22, 2008: 3

NEW CONSTRUCTION COSTS

The source used for construction costs used in the feasibility analysis is costworks.com by RS Means. They are one of the major sources of construction cost data in the United States. Their online software is available to students for a $30 ($400 discount). I am using the conceptual cost tool.[99]

To determine conceptual square foot costs, you need to input floor area, number of floors, location, labor type, construction type and building type. For apartment buildings, the gross floor area includes all floors and is measured from the outside of the foundation. The floor height and perimeter length are also variables.

As expected, there are extra expenses involved in popular design features. An increase in floor height is a nice luxury for a residential apartment, but an extra 1 foot in floor height can add approximately $2.50 per foot in construction cost to an average apartment building. A layout with a longer perimeter is usually desired because frequent jogs in the perimeter can be used to bring in light from different directions and makes for a more interesting form. This will cost extra money, though, as an extra 100 feet in perimeter length will add $7 per square foot to the average apartment building[100].

I have one concern about the accuracy of RSMeans conceptual costs. The location factor for the Scituate zip code falls under the Boston area and the location multiplier is very high, 1.21 times the national average[101]. I know from experience that construction work in the crowded city of Boston is more expensive than in the sleepy suburb of Scituate. Much of the work for this project can be done by local contractors who don't go into the city or have the same overhead. All of the outlying areas of Boston listed in RSMeans Square Foot Costs use a regional factor of 1.13 or less. I suspect that this is more accurate for Scituate and will use 1.13 as the location factor on my feasibility analysis.

The full construction cost reports used in the cash flow feasibility analysis can be found in Appendix D.

CONTRACTOR FEES

The construction costs calculated in Appendix D are raw costs, including only materials, labor

[99] RSMeans. *www.meanscostworks.com.* Kingston, November 29, 2009.
[100] RSMeans . *Square foot Costs 2008.* Kingston: Reed Construction Data, 2008. 78.
[101] RSMeans . *Square foot Costs 2008.* Kingston: Reed Construction Data, 2008. P454.

and equipment. There is a standard contractor fee of 25% that is added to the raw cost for all construction types. The contractor fee is broken down to 10% for general requirements, 5% for overhead and 10% for profit[102].

ARCHITECTURAL FEE

According to RS Means, an apartment building in the range of $10 Million will have an Architect fee of 6.6% of construction cost. [103]

PROJECT MANAGEMENT

RSMeans identifies a cost of 4% for construction management for projects under $50 Million and under $10 Million. [104]

ENGINEERING FEE

The engineering costs are normally included in the architectural fee of 6.6%. But, separate "fees must be added when utility connections require design, drainage calculations are needed,…or provisions are required to protect adjacent wetlands." [105] Any of these issues, utility connection, drainage, and wetland protection could be an issue with this site. A quote from an engineer would be ideal, but for this conceptual analysis, I will add a value of 1% of construction costs for special engineering costs.

LEGAL COSTS

For this site, there are several hurdles in to jump in order to get approval from the planning board. The RS Means cost book has legal and permitting costs at 1% of construction costs for a project of this size.

FINANCING COSTS

Construction loans are short term loans that allow builders to draw money as needed during construction. Payments are made during construction for interest only. The interest rate is usually based on the prime rate plus a percentage point or so. The balance of the loan is due at the end of the loan period.[106]

[102] Ibid., 147.
[103] Ibid., 743.
[104] Ibid.
[105] Ibid.
[106] Bankrate.com. *How Construction Loans work.* http://www.bankrate.com/brm/news/mtg/20020515c.asp (accessed

The loan amount for construction can be up to 100% of the construction costs. 100% loans are unusual, however as the lender will typically want to see at least 20% equity in the form of land ownership or a cash down payment.[107] For the following feasibility study I will assume that the developer will use all cash for the land purchase. For the construction loan, the remainder of 20% equity in the project will be paid as down payment and the rest borrowed via a construction loan.

For the interest rates in the feasibility study, I am going to assume the rate will be 6% for the initial construction loans and 5% for the mortgage loan in the rentals scenario. These interest rates are based on advertised rates. Besides the interest rate, a borrower must typically pay a 1% origination fee. Other closing costs are marginal and should not exceed $1000.[108]

SITEWORK COSTS

Site paving and landscaping is not included in the cost estimate for a building and must be calculated separately. The cost of parking lots is approximately $1200 per car. The Cost for a 20 foot wide roadway is approximately $150 per linear foot. Landscaping costs should be minimal as seeding 1 acre of grass is only $1200. Typical trees cost between 300-1500 each, installed. [109]

CASE STUDY OF A TRANSIT ORIENTED DEVELOPMENT

OLD COLONY SQUARE

There happens to be a new TOD nearby. Two stops from Greenbush, at the Cohasset station there is a new development named after the original Old Colony Railroad named Old Colony Square. The development is located at 132 Chief Justice Cushing Highway, the busiest street that runs through the Cohasset and Scituate area. The development consists of a mix of retail units and luxury apartments for lease. I consider this project an important precedent for comparison because it is current and nearby. This development can provide some important clues to the feasibility of a TOD in this area.

Old Colony Square is the area's first designated TOD. It is located within a "Transit-oriented

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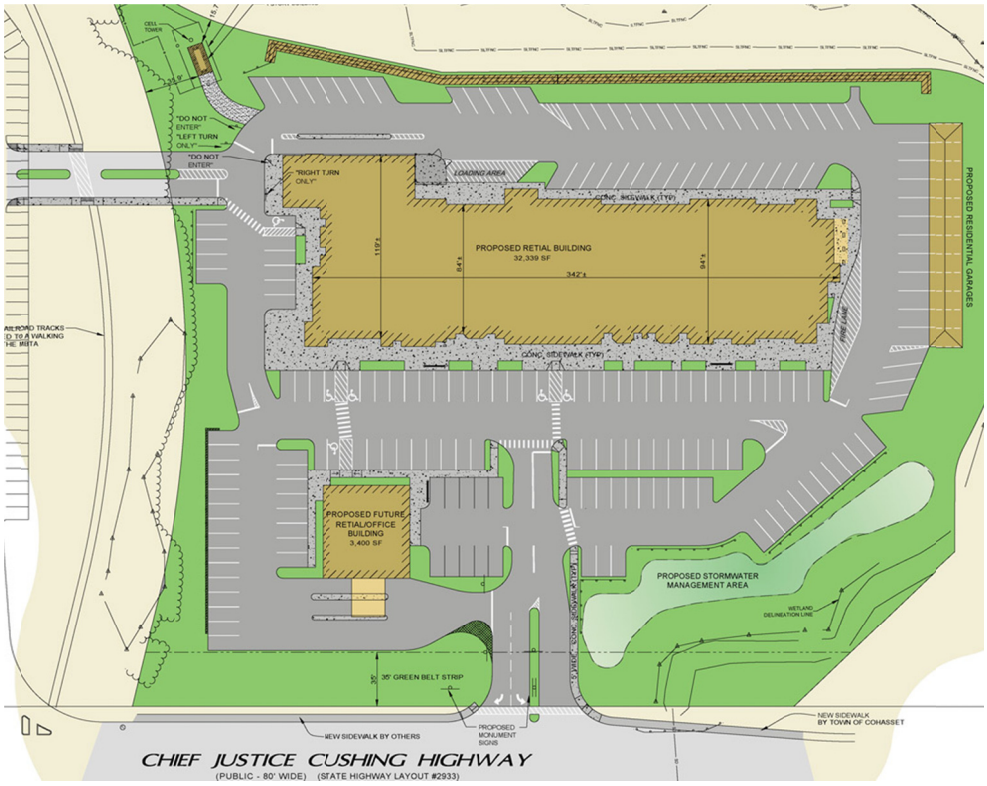
November 30, 2009).

[107] *Mortgage Q&A.* http://www.mortgageqna.com/mortgage-loan-types/commercial-construction-loan-companies (accessed November 30, 2009).

[108] ConstructionLoanCenter.com. *Rates, Fees And Closing Costs for Construction Loans.* http://www.constructionloancenter.com/rates_and_fees.htm (accessed November 30, 2009).

[109] RSMeans . *Square foot Costs 2008.* Kingston: Reed Construction Data, 2008. 447.

Overlay District" which allows for a mix of uses much like the "Village Business Overlay District" that the project site is within. It is directly adjacent to the Cohasset station parking lot and there are plenty of pedestrian connections to the train. The mix of uses for this development is mostly retail. There are 36,400 square feet of retail space and 20,900 square feet of rental apartments. The project is newly completed and being leased. Lease figures for the apartments were used in the market analysis for average rental rates. (Figure 38)[110]



[110] The Dartmouth Company. "Old Colony Square at Cohasset Station." 2009.

Figure 34 Old Colony Square site plan, rendering and 2 bedroom apartment layout

According to the agent who is leasing the apartments, Christine Powers with Coldwell Banker, there is reason to believe the apartments will rent quickly. "Being in real estate, we have definitely gotten more people looking at the area because of the train," Powers said. She expects the apartments to attract some young professional couples "looking to get their feet wet living in the suburbs," professionals looking to go green with a commute via rail, or even residents looking for a easy maintenance second home."[111] The design of the project is reminiscent of a main street village from colonial times. The lower floor is mostly brick and glass with the appearance of several smaller buildings. The 2nd floor and roof are differentiated in shapes and styles, with slate-style roofs, small, dormers, ornate bell towers and multi-faced clocks. The overall form does seem more like a village than a strip mall. I imagine that the cost of construction is considerably high with the number of details and the use of brick and glass.

While they have plenty in common, there are substantial differences between the Greenbush TOD area and Cohasset TOD. One difference is that the commute from Cohasset to South Station in Boston is about 14 minutes less on the train. Another difference is that the Cohasset TOD has much more street traffic and street frontage. It is located on a highway as opposed to the Greenbush TOD, which is near the highway, but tucked away enough for it to be missed by the passing traffic. The Cohasset TOD is therefore better suited to retail uses that require automobile traffic such as a strip mall type retail center.

Another difference between the Greenbush and Cohasset TODs is that the Cohasset site is not in

[111] White, Nancy. "Transit Oriented District is Taking Shape." *Cohasset Mariner*, November 5, 2009: 15.

a historic neighborhood like Greenbush. The highway was cut through mostly conservation land and is away from the historic villages. There is not a wide range of services within a 5 minute walk. There are some commercial services nearby, but the highway usually has speeding cars and isn't great for walking around. Greenbush, on the other hand has more potential as a vibrant walking community.

DESIGN CONCEPTS FOR A SUBURBAN TRANSIT ORIENTED DEVELOPMENT

The following ideas are the concepts for my design at 50 Country Way in Greenbush Village, Scituate, MA. The design concepts are inspired the research presented in this project.

EMBRACE SMART GROWTH

The premise of this thesis is an exercise in smart growth design. In the past decade this movement has been gaining steam, in part due to rising energy costs and carbon dioxide emissions from cars travelling long distances to and from work. Smart growth encourages people to live more compactly within existing urban and suburban areas and leave open space for rural uses. People do not necessarily want or need to live in single family homes sprawled out along interstate highways. There is a need and demand for a housing product that is smart growth and sustainable.

In 2007, a study was done by the Gregg Logan of the Environmental Protection Agency on whether there is demand for a smart growth product. His research of homebuilder surveys, smart growth studies, preference surveys by regional/metropolitan organizations, and private sector reports clearly shows that about one-third of the buying market wants the smart growth product.[112] Young people are the ones who want to live smart growth areas. According to real estate advisors RCLCO for the Urban Land Institute, the next 3 generations, (Generation X, Echo Boomers (Gen Y), and Post Echo (Gen Z)) represent over half of the U.S. population today and their numbers are increasing.

These generations have unique opinions about housing. They don't necessarily dream of the same suburban house and yard that their parents did. Younger generations are more accepting of tradeoffs for the convenience of compact living. Their preferences for housing are shifting due to changes in incomes, lifestyle and amenity preferences. Younger people are more willing to make tradeoffs in home size and back yard for "walkable" and "green" living options. 50% of Generation Y says that single family living isn't important even if having kids. The research by RCLCO has also indicated that the newer generations are shifting their preferences towards Greenfield smart growth developments on the urban fringe such as this project.[113]

The site at 50 Country Way has several features that qualify it for smart growth. It is vacant land

[112] Gregg Logan, *"The Market for Smart Growth"*, 2007.

[113] Robert Charles Lesser & Co, "Consumer Trends and Greenfield Development", 2008.

in an area with zoning for high density. Infill development is smart growth because it does not contribute to sprawl. It is zoned for mixed use development, which is smart growth because it encourages walking and less driving. Also, it is located within 1/8 mile of a commuter train station, so it encourages the use of public transportation. This concept is to adhere to smart growth principles by will maximizing the density allowed by local zoning, by providing commercial uses at the street front, and by providing pathways to access the train station.

USE LOW-COST SUSTAINABLE METHODS

Sustainability is in demand, and it is on of the most popular topic in architectural design these days. But, there is generally a significant cost tied to a sustainable building, especially LEED certified buildings with endless requirements and paperwork. Fortunately for this low budget project, there are many ways to be sustainable without driving up the cost.

These are the sustainable methods that I will focus on in my design. One way to save energy is to design a building so that it maximizes the passive heating and cooling potential in an area. As shown in my research into climate (figure 10) there is an optimum orientation that will take advantage of passive heating from the sun. Because of the long and cold winters the "optimum orientation" is almost due south, just a few degrees to the west of south. In this orientation the building will absorb as much of the sun's heat as possible.

This concept was influenced by Christopher Alexander's theory about designing narrow "wings of light" that spread out to catch light. The idea is to create narrow buildings with plenty of corners to collect light and warmth during different times of day. In addition to providing seasonal passive heating, this method of designing for sunlight provides daylighting advantages. Daylighting is another sustainable method that does not necessarily add extra cost. One downside to catching lots of light is that it will create some overheated days in the summer, but this can be abated by shading and air conditioning. Essentially, the overheating is a necessary tradeoff for passive heating during colder months.

Passive cooling is another way to save energy. On days where it is warm enough to use air conditioning, but not extremely hot, a user can take advantage of prevailing winds for cooling. Fortunately, the prevailing winds in the summer are directly of the south, the same orientation as the "optimum orientation" for passive heating. In order to allow the prevailing summer winds through the building, I have chosen a single-loaded design that allows air to pass freely

through the building.

Another way that the building can interact with nature is to fend off the cold northerly prevailing winds in the winter. The northern sides of buildings should provide protection from the wind where possible. The north side can be designed with parking and circulation pathways, leaving the south side for green space and large windows.

Having grown up in this area, I can personally attest to the extremes in climate in this area. The cold wind can be brutal in the winter, moist and chilling "to the bone" for months at a time. I am certain that any person who lives in a building facing south with windows to catch light and warmth from the sun and solid walls to protect from cold winds from the north will appreciate their home.

Another way that this project can be sustainable without incurring too much extra cost is by taking advantage of sustainable water management. The site is in a sensitive watershed district, and any project will be scrutinized by the design review board for its ability to control runoff water. For this project I plan to use permeable paving surfaces for driveways and parking stalls. There are permeable asphalt products on the market that can let water pass through and do not cost more money. Another way of controlling water runoff is to capture the water from the roofs of buildings. I plan to route the building runoff water from the roof to a small water feature that can be used in the garden for pleasure and also for irrigation. This not only prevents runoff but also saves money as water bills can be high for landscaping.

A final way of practicing low cost sustainable design is leaving the existing building intact. The existing 6 apartment building is functional and does not need to be demolished. The building is over 100 years old. While it's not protected any historic registries like other buildings on Country way, I think it's one of the better looking old buildings in the neighborhood and it certainly has some historic value.

PROVIDE SMALL APARTMENTS

The size of American households has been decreasing steadily for the past 100 years. An average household was 4.6 people in 1900 and 2.59 people in 2000. This trend will likely continue. Single-person households are more common than ever, and they are the main target for this project. Single-person households are projected to account for 34% of household

growth between 2000 and 2025.[114]

As households are getting smaller, and there are more single-person households, smaller homes just make sense. The young people who make up the majority of single person households are more accepting of higher density development and will be happy to live a small apartment.

Small apartments also easily meet affordable requirements of the Village Business Overlay District. My design requires at least 15% affordable units. This requirement can easily be met without alterations in plans because small units are naturally less expensive. The standards set by the federal government for affordable housing are based on the price of housing, not the price per square foot.

It was shown from my research that small units in this economy provide the best chance for good return. 1 bedroom units yield the highest returns for both rentals and sales. For new condos for sale, the average price per square foot for a comparable 2 bedroom is $240 condo while the average price per foot of a 1 bedroom is much higher, at $282 per s.f. These higher prices per square foot and can be an excellent way to boost profitability.

One bedroom units are good point of emphasis for a strategy, but there is not a proven market for one bedroom units in the area despite the research showing changing attitudes. In the local area there have been only a few dozen new 1 bedroom units to sell in the past year. The sales rate could be because of a shortage of demand or possibly only because the market does not have a lot of 1 bedroom units to sell, being a mostly single family home market. Because there is a chance that a development with all small units might not sell quickly, I believe that about half of the units should be 2 and 3 bedroom units. While the price per foot is not as high, the units will help the project sell out more quickly, as shown by the pro-forma analysis in appendix B.

I've been a licensed real estate agent for almost 20 years, and I spent about 5 years managing rental property in Scituate, including the building on the project site. From my experience, 1 bedroom rentals are the fastest to rent out, and can be the easiest to sell. The tenants and buyers that are looking for 1 bedroom apartments are usually single with enough income to handle the rent. They also tend to be working during the day and the environment is more peaceful. I believe that many of these single working people will be using the commuter train

[114] Robert Charles Lesser & Co, "Consumer Trends and Greenfield Development", 2008.

into Boston, so it is a natural fit for the site.

SMALL COMMERCIAL UNIT AT STREETFRONT

Commercial property in this area has some appeal, as proven by the bustling bakery next door, but because of the feasibility issues I believe it should be limited to one small unit. One negative about commercial development is that it requires about 3 times more parking per square foot, this is a real burden on the land and the lot can quickly become a sea of pavement. Another negative about commercial property is that it can be hard to find tenants. But, one small street-front unit should be easy to rent and will provide better income than a rental apartment.

My design includes one single story freestanding commercial building along the street-front. It's a small building of 1630 square feet. The smaller size serves a few purposes. First, it mimics the older small nearby buildings and visually provides a gradual height increase from the street to 40 feet in the rear of the lot. Second, the small commercial space, presumably a restaurant, could fulfill a definite need for a transit-oriented development. Small restaurants are in high demand in the area and could be a good fit. Third, a small building doesn't overwhelm the attractive façade of the historic building behind it.

MAXIMIZE GREEN OPEN SPACE

According to RCLCO real estate research group, the highest valued amenities for housing development include open space (both for views and recreation), a connection to nature, and paths and trails (almost always the #1 most important amenity). My design concept for this project is to maximize the open green space available. It is a difficult task given a small, high density site. My design reached the maximum allowable density, and yet I was still able to more than double the 20% open space requirement by providing 46% open space for the users of the site.

Where possible, I connected the ground floor units to their own private garden enclosed by a fence. I also kept a large area of land open as a community garden. It is large enough to play catch with a ball, and to have several outdoor eating and resting areas.

The site is adjacent to a public pathway that was installed by the MBTA when the train station was built as a concession. The path leads to another section of the village to the south with an assortment of services and eventually the ocean and nature paths. As this is an important feature for the residents, I will provide a secure gate with access to the path.

Also, there is currently a large open site to the south of the project. This land will likely be developed someday, but for now, my design takes advantage of the open land available to the south for viewing of open space.

Providing ground level parking is a major challenge to any site. It has a way of engulfing a smaller lot. One way to preserve green space is to have "avenues of parking" rather than large lots. This concept encourages street parking and small clusters of parking along the street or driveway. In-between the clusters should be trees and green space. This concept works well with this long site that requires long streets for access.

ENCOURAGE TRANSIT USE

The design should take advantage of the proximity of the development to the train station. There is a public path that loops around the neighborhood and stops abruptly at the project site. There is also a bridge that crosses the train tracks. Access to the bridge helps people reach the train on time. My concept is to provide access to the sidewalk that connects to the bridge and also provide secure access to the path at the rear of the site that connects to the south part of the village. The path also is another route to the train station without hiking up and down over the bridge and may provide the best route to the train for some people even though it is longer. A resident may want to visit the Dunkin Donuts on the south side of the village before catching the train, and the path would be the best option.

Another way to connect to the train is visually. Most of the land adjacent to the rail is blocked by a 30' wall that separates the train tracks from the public path as a concession by the MBTA. While the wall could protect from noise, I am convinced that this end of line station is not very noisy because the trains are always moving very slowly past the property. I think not having the large wall to the east is a blessing because a tall wall can seem oppressive and blocks morning sun. I plan to leave a view channel through the site towards the train platform so that the people can peek to see if the train has arrived. As it's the only lot in the Greenbush village along Country Way that can see the train, I think it would be beneficial both for the people on the property who use the train regularly and for the property's transit-oriented image.

ACOUSTICAL DESIGN

When I visited the site last summer, I found the train's passing noise to be quite low. Since it is the end of the line station, the trains are travelling very slowly in and out. My opinion is that it

isn't very noisy. There surely are people more sensitive than me, so there were some measures taken to alleviate the noise. First, the shorter ends of the buildings are facing the tracks so a minimum of surface is exposed to the direct noise. On the sides of the buildings facing the track, smaller windows are used and will be triple glazed. Also, the buildings are laid out so that noise will not reverberate between the buildings. A 10' solid wall is used on the edge of the property facing the tracks, and large coniferous trees are used to help filter noise out.

DESIGN FOR 50 COUNTRY WAY

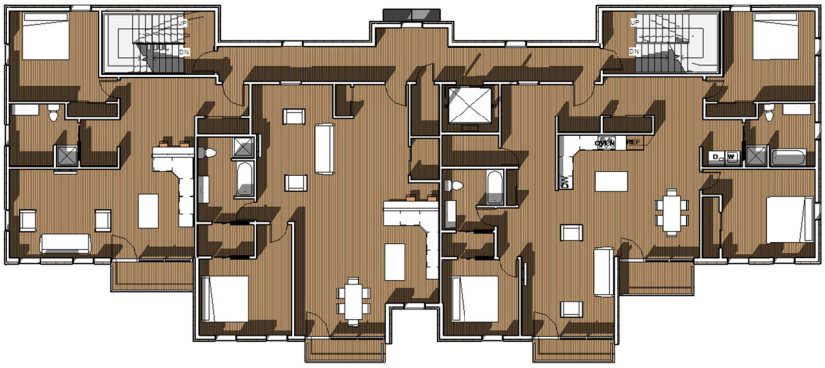
Figure 35 Site Plan

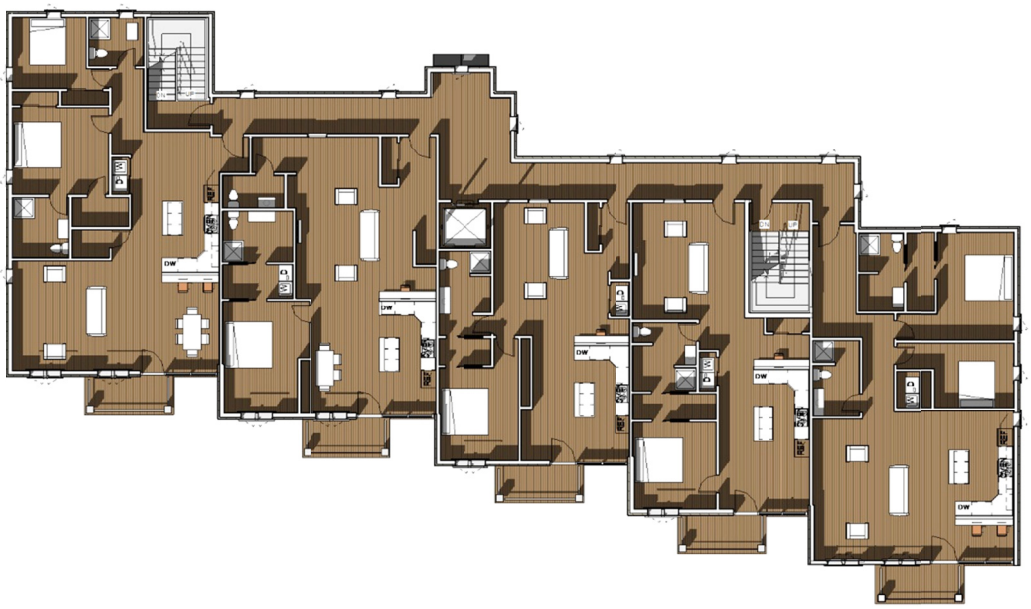
The plan consists of two new residential buildings in the rear of the site one new commercial building facing Country Way. The existing 5 unit structure remains in the plan. There are 31 units total, the maximum allowed under the local ordinance. In the two large residential buildings, there are 17 one bedroom apartments, 6 two bedroom units and 2 three bedroom units. The plan includes 42 required parking stalls.

One of the main design concepts is to keep a large portion of open space. 20% open space is required by zoning regulations, but I was able to provide 46% open space.

The site has a very narrow street frontage. The new commercial unit sits as close as 5’ from the sidewalk on country way, providing easy access and visibility. The rear of the commercial unit is windowless and forms a protective border for the small garden between the buildings that the residents of the existing apartment building can enjoy.

All of the new residential units are located behind the existing apartment building. Each ground floor unit has their own enclosed garden space. A network of paths connects the building with the public path. The residential area is enclosed by fences for security. The common garden features two cookout areas for entertaining and a water catchment pond.





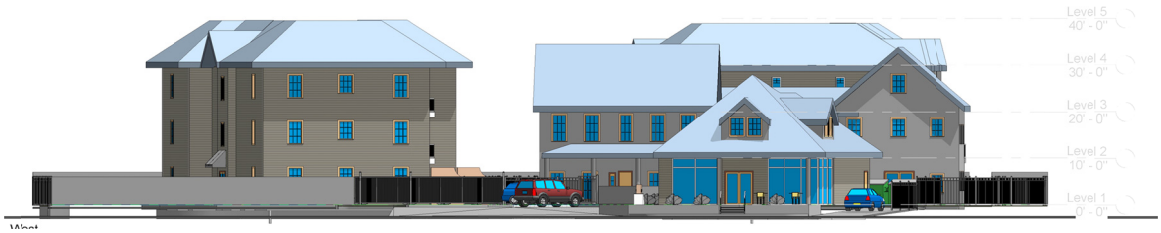
Plans for 2nd and 3rd level units: Because of the single loaded corridor, all units can face the same way in order to interact with the climate. All units have large windows facing south where they can absorb the sun's light and warmth in the cold winters.

In the larger two and three bedroom units kitchens, living areas and master bedrooms are located near the large windows to provide light. In the interior units, the rooms to the north that are facing the hallway are some of the darkest spaces and are used for living rooms. These rooms are darker and more appropriate for viewing a TV or using a computer. There is a window high on the wall to allow for ventilation. Most designers would use this darker area for a kitchen, but I believe that a kitchen in a smaller apartment is more deserving of the southern wall than the TV area. The kitchen island is the place where guests gravitate to and the kitchen is a showcase for the expensive modern appliances and granite countertops. The kitchen deserves to be well lit and to the south.

The hallways to the north provide additional insulation from the cold prevailing northerly winds. In the summer, the windows in the hall and the doors and windows in the apartments can be opened to allow prevailing southerly breezes through the units for cross ventilation, a feature not available with double loaded corridors.

The south facing elevation has larger openings to allow radiant heat and light to enter during cold months.

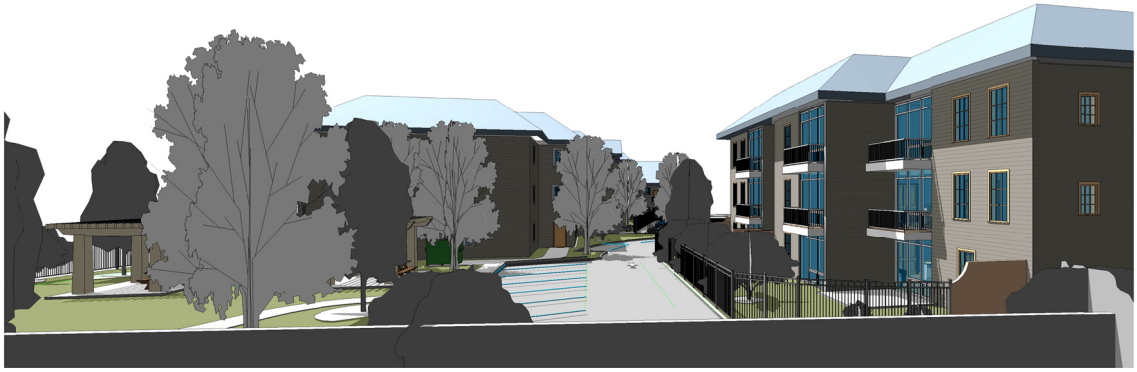
Residents of ground floor units have their own secure garden.



The west facing elevation along Country Way

View from intersection of Country Way and Stockbridge Street.

The northern side is used for circulation and parking. The northerly winds are protected by smaller windows and a circulation hallway buffer.



This is the view from the commuter train.

ECONOMIC FEASIBILITY SCENARIOS

I chose to create three economic feasibility scenarios; all rentals, all sales, and a combination of rentals and sales. The following sections briefly summarize each scenario. The complete cash flow pro-forma worksheets can be found in appendix a-c.

The construction of the three new buildings in the three scenarios takes 1.75 years. The developer is only investing as little cash as possible, so the cash investment is limited to necessary financing costs such as interest and fees, loan down payment, land purchase costs, and out of pocket investments when cash flow is negative. In addition to construction costs and financing, there are holding costs such as maintenance, utilities and taxes that need to be accounted for.

In all three scenarios, the construction is calculated the same way. Construction costs are conceptual or square foot based, using RS Means software that includes the latest local construction costs. The construction type is 1-3 story apartments for the residential buildings and restaurant for the commercial building. The materials chosen were the least expensive, wood frame with wood siding. Costs are based on a location in Massachusetts for the 4th Quarter of 2010. The software requires input of gross square footage measured from exterior walls, perimeter and floor height, and it will give per-square foot cost for the project.

It should be noted that the raw construction cost is based on the gross s.f. measured from the outside of exterior walls. This raw cost is non-inclusive of soft costs such as contractor profits, architects, engineers etc. The raw construction cost for the project is $100.78 per s.f. for the apartments, and $177.08 per s.f. for the commercial building. If all of the soft costs for construction are added to the raw cost, total construction costs rise from $100.78 to $195.74, an increase of 95%. When discussing per square foot costs, it is important to know what is included. The soft costs such as contractor fees, architects, project management and real estate commissions add significantly to the amount.

ALL RENTALS SCENARIO

The cash flow pro-forma sheet for this scenario is located in Appendix A. In this scenario all 31 units are offered for rent. The rents are based on current market conditions and average $1331 per month for a 1 bedroom unit, $1655 per month for a 2 bedroom unit, $1951 per month for a 3 bedroom unit, and $2641 per month for the commercial unit. The rents are adjusted for 5%

vacancy.

Making money from a new rental property is sort of like starting a new business. It takes many years of investment for it to take off. In this case there isn't a positive cash flow until after the 15 year loan is paid off, which is 17 years after starting construction. This scenario is not ideal for an impatient or cash poor developer. It requires a consistent investment of about $100,000 per year to keep the project above water until the loan is paid off. I imagine this scenario is best for an investor with deeper pockets who wants to take advantage of tax shelters in the form of depreciation and property losses for 15 years or so. The developer would be required to invest $2.9 Million in cash in the entire project over the 20 years, (almost twice the amount of cash needed for the developer of an all sales scenario). After the loan is paid off, however, the project becomes a cash cow that produces lots of net income each year without much expense. By 2030, the project would be netting $1 Million per year in income. This excellent return down the road can only be achieved with great patience and money on the side, but is well worth it in terms of the life of the buildings. At the end of the 20 year cash flow, the developer is the owner of an excellent income stream and valuable asset in the form of condos that can be sold. Please refer to Appendix A for the 20 year cash flow worksheet.

ALL SALES SCENARIO

The cash flow pro-forma sheet for this scenario is located in Appendix B. In this scenario all 31 units are offered for sale. The sale prices are based on current market conditions for similar units. Prices average $278,000 for a 1 bedroom unit, $317,000 for a 2 bedroom unit, and $353,000 for a 3 bedroom unit.

In recent years, for-sale developments have been popular with developers and buyers due to a combination of lower labor/material costs and skyrocketing home prices and future expectations. That time has passed, however, and the market has recently flipped directions with higher construction costs and lower prices and expectations taking control.

The results of the 5 year pro-forma cash flow for this scenario are positive. Over the course of 5 years, a developer would need to invest $1,744,904. The return at the end of 5 years is 44% of money invested, and average of 9% per year, a decent return on investment for a developer. While the return is good enough, I believe that a developer's profits could be improved in the future. Real estate markets tend to follows a repeating cycle of increasing and decreasing

prices. In my opinion, market for condo sales will recover strongly because of population growth, changing preferences towards smaller apartments and the scarcity of developable land available.

MIX OF RENTALS AND SALES

The cash flow pro-forma sheet for this scenario is located in Appendix C. In this scenario, the largest new building is sold as condo units and the rest of the units are held onto as rentals for the long term. The prices for rental units and sales are the same as previous scenarios.

This scenario may be appropriate for an investor or developer who wants a long term real estate holding, but can't afford to keep the development afloat with as much cash as long as the all rental scenario. In this scenario, the development starts to create a positive cash flow after 11 years instead of 17. The cash invested in this scenario is less as well, about $1 Million less than the all rentals scenario. At the end of the 20 year period, however this mixed of rentals and sales scenario receives approximately half of the net cash flow as the all rentals scenario. The income per quarter after 17 years is $120,000 for the all rentals scenario, but only $55,000 per quarter for the mix of rentals and sales.

The mixed scenario yields mixed results. It is less expensive from an investment standpoint. But, if a developer is able to invest an additional $1.1 Million in order to keep all of the rentals, then he is handsomely rewarded at the end of the loan term 17 years later.

CONCLUSION

From my research, design and cash flow pro-forma analysis, it was shown that my design for a transit-oriented development could be feasible as a for-sale development or for-lease development. An investor could make a respectable 9% annual return on investment creating a for-sale transit-oriented development. An investor who has money and patience could eventually enjoy excellent cash flow of approximately $480,000 per year after 17 years and enjoy tax benefits from depreciation and earlier losses.

After my research and analysis, I've come to the conclusion that a carefully-designed TOD is feasible and would be appropriate for this site. A transit-oriented development at 50 Country Way has potential to meet the needs of many people. It can help the town of Scituate achieve an acceptable level of affordable housing. It will help smaller households find the compact and

efficient housing that they demand. The development would also help reduce traffic on the highways by encouraging rail transit use. This type of compact, livable and walk-able development will, in theory, help the environment and build stronger communities by encouraging people to walk more and leave their cars behind.

APPENDIX A: CASH FLOW WORKSHEETS FOR ALL RENTALS SCENARIO

All Rentals Scenario | Wood Construction | Within Local Zoning Guidelines

TRANSIT-ORIENTED DEVELOPMENT FOR 50 COUNTRY WAY, GREENBUSH VILLAGE, SCITUATE, MA

Land area (s.f.)	61391
Gross Building Areas (s.f.)	41789
Floor Area Ratio (FAR)	0.68
Open Space (s.f.)	28010
Open Space %	46%
Allowable Units (20/40,000 s.f.)	31

Condominiums for Sale	# of units	total s.f.	$/s.f.
new 1 bedroom	0		282
new 2 bedroom	0		240
new 3 bedroom	0		214
new commercial	0		300

20 Year Cash Flow Analysis			Quarterly Cash Flow Analysis 2011-2031							
			2011	2011	2011	2011	2012	2012	2012
Categories	Totals		Q1	Q2	Q3	Q4	Q1	Q2	Q3
REVENUES									
New 1 bedroom rentals	$	6,040,880			*1.75 year construction period*				
New 2 bedroom rentals	$	2,819,339							
New 3 bedroom rentals	$	1,041,108							
New commercial lease	$	704,715							
Existing 1 bedroom rentals	$	533,899	5,130	5,156	5,181	5,207	5,233	5,260	5,286
Existing 2 bedroom rentals	$	1,057,417	10,160	10,211	10,262	10,313	10,365	10,417	10,469
gross rental income	$	12,197,359	15,290	15,367	15,444	15,521	15,598	15,676	15,755
LOAN IN	$	9,875,117	617,195	617,195	617,195	617,195	617,195	617,195	617,195
EXPENSES									
HARD COSTS									
Land Acquisition ($531k / Acre)	$	748,361	748,361						
closing costs	$	3,742	3,742						
Building Construction Costs	$	3,848,733	549,819	549,819	549,819	549,819	549,819	549,819	549,819
Sitework									
Watershed treatment	$	60,000	30,000	30,000					
Paving ($1,200 / stall)	$	50,320							25,160
Landscaping	$	80,000							
SOFT COSTS									
Architectural Fee (6.6 % of construction)	$	254,016	31,752	31,752	31,752	31,752	31,752	31,752	31,752
Contractor's Fee (25 % of construction)	$	962,183	120,273	120,273	120,273	120,273	120,273	120,273	120,273
Project Management (4% of construction)	$	153,949	19,244	19,244	19,244	19,244	19,244	19,244	19,244
Engineering (1% of construction)	$	38,487	4,811	4,811	4,811	4,811	4,811	4,811	4,811
Legal & Permits (1% of construction)	$	38,487	4,811	4,811	4,811	4,811	4,811	4,811	4,811
total construction cost	$	6,238,279	1,512,813	760,709	730,709	730,709	730,709	730,709	755,869
HOLDING COSTS									
Real Estate Management (5% of rent)	$	609,868	765	768	772	776	780	784	788
Taxes	$	1,596,865	1,490	1,497	1,505	1,512	1,520	1,527	1,535
Utilities	$	588,323	3,726	3,745	3,763	3,782	3,801	3,820	3,839
Insurance/other	$	336,271	1,200	1,206	1,212	1,218	1,224	1,230	1,236
Maintenance	$	563,740	1,500	1,508	1,515	1,523	1,530	1,538	1,546
total holding costs	$	3,695,066	8,680	8,724	8,767	8,811	8,855	8,899	8,944
CONSTRUCTION LOAN (6%)									
cash down payment	$	623,828	623,828						
interest rate		6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
interest only paid	$	333,285	9,258	18,516	27,774	37,032	46,290	55,548	64,805
loan fees (1%)	$	38,487	38,487						
loan drawdown			617,195	617,195	617,195	617,195	617,195	617,195	617,195
repayment		4,937,559	0	0	0	0	0	0	0
loan balance			617,195	1,234,390	1,851,584	2,468,779	3,085,974	3,703,169	4,320,364
total construction loan	$	995,600							
15 YEAR LOAN (5%)									
interest payments	$	2,298,754							
principal payments	$	4,937,559							
loan fees	$	49,376							
total loan expense	$	13,218,847	$671,573	$18,516	$27,774	$37,032	$46,290	$55,548	$64,805
NET CASH FLOW	$	(1,039,106)	(1,560,581)	(155,387)	(134,612)	(143,837)	(153,061)	(162,285)	(196,669)
cash balance			(1,560,581)	(1,715,968)	(1,850,580)	(1,994,417)	(2,147,478)	(2,309,763)	(2,506,432)
After Tax income	n.a.								
Total Cash Invested	$	2,748,323	*Includes land acquisisiton, loan down payment, interest, and negative cash flow paid out of pocket*						
Leftover Assets	$	9,862,848	*20% added for future year 2031 value*						
Net Assets and cash	$	8,823,742	*net cash plus present value of properties*						
20 yr return on Cash Investment		321%							
Average annual return		16%							

Type	Total Units	Parking Required
1 br.	19	19
2 br.	9	13.5
3 br.	2	4
commercial	1630	5.4
	31	41.93

Village Business Overlay District:
20 units per 40,000 s.f.
20% open space
3 story limit
1 parking per 1 Bedroom
1.5 Parking stalls per 2 bedroom
2 Parking stalls per 3 bedroom

Apartments for Rent	# of units	total s.f.	$/s.f./mo	Avg. s.f.	Avg Rent
new 1 bedroom	17	16767	1.35	986	$ 1,331
new 2 bedroom	6	7943	1.33	1324	$ 1,761
new 3 bedroom	2	3306	1.18	1653	$ 1,951
new commercial	1	1630	1.62	1630	$ 2,641
Existing 1 bedroom	2	1500	1.2	750	$ 900
Existing 2 bedroom	3	3100	1.15	1033	$ 1,188
	31	34246		Vacancy	0.05
				Inflation/yr	0.02

2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2
64,511	64,834	65,158	65,484	65,811	66,140	66,471	66,803	67,137	67,473	67,810
30,108	30,258	30,410	30,562	30,715	30,868	31,023	31,178	31,334	31,490	31,648
11,118	11,174	11,230	11,286	11,342	11,399	11,456	11,513	11,571	11,629	11,687
7,526	7,563	7,601	7,639	7,677	7,716	7,754	7,793	7,832	7,871	7,911
5,312	5,339	5,366	5,392	5,419	5,446	5,474	5,501	5,529	5,556	5,584
10,521	10,574	10,627	10,680	10,733	10,787	10,841	10,895	10,950	11,004	11,059
129,096	129,742	130,390	131,042	131,698	132,356	133,018	133,683	134,351	135,023	135,698
617,195	4,937,559	0	0							
25,160										
80,000										
31,752										
120,273										
19,244										
4,811										
4,811										
286,050										
6,455	6,487	6,520	6,552	6,585	6,618	6,651	6,684	6,718	6,751	6,785
16,940	17,025	17,110	17,195	17,281	17,368	17,455	17,542	17,630	17,718	17,806
6,000	6,030	6,060	6,090	6,121	6,152	6,182	6,213	6,244	6,275	6,307
3,500	3,518	3,535	3,553	3,571	3,588	3,606	3,624	3,642	3,661	3,679
6,000	6,030	6,060	6,090	6,121	6,152	6,182	6,213	6,244	6,275	6,307
38,895	39,089	39,285	39,481	39,679	39,877	40,076	40,277	40,478	40,680	40,884
6.0%										
74,063										
617,195										
0	4,937,559									
4,937,559	(loan balance paid off by new 15 year loan)									
	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313
	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293
$74,063	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605
347,282	(29,953)	(29,499)	(29,044)	(28,586)	(28,126)	(27,664)	(27,199)	(26,732)	(26,263)	(25,791)
(2,159,150)	(2,189,103)	(2,218,602)	(2,247,646)	(2,276,232)	(2,304,358)	(2,332,022)	(2,359,221)	(2,385,953)	(2,412,216)	(2,438,006)

Building A: 1 Br. Units	
Unit	interior (s.f.)
106	951
107	955
108	1196
206	963
207	955
208	1185
306	958
307	958
308	1188
total 1br. s.f.	9309
1 br units	9

Building A: 2 Br. Apts	
Unit	interior (s.f.)
105	1331
109	1321
205	1328
209	1328
305	1316
309	1319
total 2br s.f.	7943
2 br. units:	6

Building B: 1 Br. Units	
Unit	interior (s.f.)
103	930
104	859
203	1121
204	869
301	900
302	883
303	1033
304	863
total 1 br. s.f.	7458
2br. Units	8

Building B: 3 Bedroom Apts.	
Unit	int. (s.f.)
101	1630
201	1676
total s.f.	3306
3 br units:	2

Building C: Commercial Unit		
Unit		int. (s.f.)
100		1630
total commercial s.f.		1630
Commercial units:		1

Quarterly Cash Flow Analysis 2011-2031

2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2
68,149	68,490	68,832	69,177	69,522	69,870	70,219	70,570	70,923	71,278	71,634	71,993
31,806	31,965	32,125	32,285	32,447	32,609	32,772	32,936	33,101	33,266	33,432	33,600
11,745	11,804	11,863	11,922	11,982	12,042	12,102	12,162	12,223	12,284	12,346	12,407
7,950	7,990	8,030	8,070	8,110	8,151	8,192	8,233	8,274	8,315	8,357	8,398
5,612	5,640	5,668	5,696	5,725	5,754	5,782	5,811	5,840	5,869	5,899	5,928
11,115	11,170	11,226	11,282	11,339	11,395	11,452	11,509	11,567	11,625	11,683	11,741
136,377	137,059	137,744	138,433	139,125	139,820	140,520	141,222	141,928	142,638	143,351	144,068
6,819	6,853	6,887	6,922	6,956	6,991	7,026	7,061	7,096	7,132	7,168	7,203
17,895	17,985	18,075	18,165	18,256	18,347	18,439	18,531	18,624	18,717	18,811	18,905
6,338	6,370	6,402	6,434	6,466	6,498	6,531	6,564	6,596	6,629	6,663	6,696
3,697	3,716	3,734	3,753	3,772	3,791	3,810	3,829	3,848	3,867	3,886	3,906
6,338	6,370	6,402	6,434	6,466	6,498	6,531	6,564	6,596	6,629	6,663	6,696
41,088	41,294	41,500	41,708	41,916	42,126	42,336	42,548	42,761	42,975	43,190	43,406
38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313
82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293
$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605
(25,317)	(24,840)	(24,362)	(23,880)	(23,397)	(22,911)	(22,422)	(21,931)	(21,438)	(20,942)	(20,444)	(19,943)
(2,463,323)	(2,488,163)	(2,512,525)	(2,536,405)	(2,559,802)	(2,582,713)	(2,605,135)	(2,627,066)	(2,648,504)	(2,669,446)	(2,689,890)	(2,709,832)

Existing Building		Building A	Gross Area	Perimeter	Floor Height
2 bedroom units:	3		7097	437'	10'
1 bedroom units:	2		7097		
2 bedroom s.f.	3100		7097		
1 bedroom s.f.	1500		21291	gross s.f.	
		Construction Type: 3 Story Wood Frame/Wood Siding			
		Construction Cost per Square Foot			100.78
		Building Cost			$ 2,145,707

Building B	Gross Area	Perimeter	Floor Height
Level 1	4667	345'	10'
Level 2	4667		
Level 3	4667		
	14001	gross s.f.	
Construction Type: 3 Story Wood Frame/Wood Siding			
Construction Cost per Square Foot			100.78
Building Cost			$ 1,411,021

Building C	Gross Area	Perimeter	Floor Height
	1649	179	10'
	1649	gross s.f.	
Construction Type: 3 Story Wood Frame/Wood Siding			
Construction Cost per Square Foot			177.08
Building Cost			$ 292,005

Existing	Gross Area	Perimeter	Floor Height
Level 1	2424	295'	10'
Level 2	2424		
	4848	gross s.f.	
Construction Type: 2 Story Wood Frame/Wood Siding			

Quarterly Cash Flow Analysis 2011-2031

2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2
72,352	72,714	73,078	73,443	73,810	74,179	74,550	74,923	75,298	75,674	76,053	76,433
33,768	33,936	34,106	34,277	34,448	34,620	34,793	34,967	35,142	35,318	35,495	35,672
12,470	12,532	12,595	12,657	12,721	12,784	12,848	12,913	12,977	13,042	13,107	13,173
8,440	8,483	8,525	8,568	8,611	8,654	8,697	8,740	8,784	8,828	8,872	8,916
5,958	5,988	6,018	6,048	6,078	6,108	6,139	6,170	6,201	6,232	6,263	6,294
11,800	11,859	11,918	11,978	12,038	12,098	12,159	12,219	12,280	12,342	12,404	12,466
144,788	145,512	146,240	146,971	147,706	148,444	149,186	149,932	150,682	151,435	152,193	152,954
7,239	7,276	7,312	7,349	7,385	7,422	7,459	7,497	7,534	7,572	7,610	7,648
18,999	19,094	19,190	19,286	19,382	19,479	19,576	19,674	19,772	19,871	19,971	20,071
6,729	6,763	6,797	6,831	6,865	6,899	6,934	6,968	7,003	7,038	7,073	7,109
3,925	3,945	3,965	3,985	4,005	4,025	4,045	4,065	4,085	4,106	4,126	4,147
6,729	6,763	6,797	6,831	6,865	6,899	6,934	6,968	7,003	7,038	7,073	7,109
43,623	43,841	44,060	44,280	44,502	44,724	44,948	45,172	45,398	45,625	45,853	46,083
38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313
82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293
$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605
(19,440)	(18,934)	(18,425)	(17,915)	(17,401)	(16,885)	(16,366)	(15,845)	(15,321)	(14,795)	(14,266)	(13,734)
(2,729,272)	(2,748,206)	(2,766,631)	(2,784,546)	(2,801,947)	(2,818,832)	(2,835,198)	(2,851,043)	(2,866,365)	(2,881,160)	(2,895,426)	(2,909,160)

Quarterly Cash Flow Analysis 2011-2031

2021 Q3	2021 Q4	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2
76,815	77,199	77,585	77,973	78,363	78,755	79,148	79,544	79,942	80,342	80,743	81,147
35,850	36,030	36,210	36,391	36,573	36,756	36,939	37,124	37,310	37,496	37,684	37,872
13,239	13,305	13,371	13,438	13,505	13,573	13,641	13,709	13,777	13,846	13,916	13,985
8,961	9,006	9,051	9,096	9,142	9,187	9,233	9,279	9,326	9,372	9,419	9,466
6,325	6,357	6,389	6,421	6,453	6,485	6,518	6,550	6,583	6,616	6,649	6,682
12,528	12,591	12,654	12,717	12,780	12,844	12,908	12,973	13,038	13,103	13,169	13,234
153,718	154,487	155,259	156,036	156,816	157,600	158,388	159,180	159,976	160,776	161,580	162,387
7,686	7,724	7,763	7,802	7,841	7,880	7,919	7,959	7,999	8,039	8,079	8,119
20,171	20,272	20,373	20,475	20,577	20,680	20,784	20,888	20,992	21,097	21,202	21,308
7,144	7,180	7,216	7,252	7,288	7,325	7,361	7,398	7,435	7,472	7,510	7,547
4,168	4,188	4,209	4,230	4,252	4,273	4,294	4,316	4,337	4,359	4,381	4,403
7,144	7,180	7,216	7,252	7,288	7,325	7,361	7,398	7,435	7,472	7,510	7,547
46,313	46,545	46,777	47,011	47,246	47,483	47,720	47,959	48,198	48,439	48,682	48,925
38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313
82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293
$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605
(13,200)	(12,663)	(12,123)	(11,581)	(11,036)	(10,488)	(9,937)	(9,384)	(8,828)	(8,269)	(7,707)	(7,143)
(2,922,360)	(2,935,023)	(2,947,146)	(2,958,727)	(2,969,762)	(2,980,250)	(2,990,187)	(2,999,571)	(3,008,399)	(3,016,668)	(3,024,375)	(3,031,518)

Quarterly Cash Flow Analysis 2011-2031

2024 Q3	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4	2026 Q1	2026 Q2	2026 Q3	2026 Q4	2027 Q1	2027 Q2
81,553	81,961	82,370	82,782	83,196	83,612	84,030	84,450	84,873	85,297	85,723	86,152
38,062	38,252	38,443	38,635	38,828	39,023	39,218	39,414	39,611	39,809	40,008	40,208
14,055	14,125	14,196	14,267	14,338	14,410	14,482	14,554	14,627	14,700	14,774	14,848
9,514	9,561	9,609	9,657	9,705	9,754	9,803	9,852	9,901	9,951	10,000	10,050
6,716	6,749	6,783	6,817	6,851	6,885	6,920	6,954	6,989	7,024	7,059	7,094
13,301	13,367	13,434	13,501	13,569	13,636	13,705	13,773	13,842	13,911	13,981	14,051
163,199	164,015	164,835	165,660	166,488	167,320	168,157	168,998	169,843	170,692	171,545	172,403
8,160	8,201	8,242	8,283	8,324	8,366	8,408	8,450	8,492	8,535	8,577	8,620
21,415	21,522	21,630	21,738	21,847	21,956	22,066	22,176	22,287	22,398	22,510	22,623
7,585	7,623	7,661	7,699	7,738	7,777	7,815	7,855	7,894	7,933	7,973	8,013
4,425	4,447	4,469	4,491	4,514	4,536	4,559	4,582	4,605	4,628	4,651	4,674
7,585	7,623	7,661	7,699	7,738	7,777	7,815	7,855	7,894	7,933	7,973	8,013
49,170	49,415	49,663	49,911	50,160	50,411	50,663	50,917	51,171	51,427	51,684	51,943
38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313	38,313
82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293	82,293
$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605	$120,605
(6,575)	(6,005)	(5,432)	(4,856)	(4,278)	(3,696)	(3,111)	(2,524)	(1,934)	(1,340)	(744)	(145)
(3,038,093)	(3,044,099)	(3,049,531)	(3,054,387)	(3,058,665)	(3,062,361)	(3,065,472)	(3,067,996)	(3,069,930)	(3,071,270)	(3,072,014)	(3,072,158)

Quarterly Cash Flow Analysis 2011-2031

2027 Q3	2027 Q4	2028 Q4	2028 Q4	2028 Q4	2028 Q4	2029 Q4	2029 Q4	2029 Q4	2029 Q4	2030 Q4	2030 Q4
86,583	87,016	87,451	87,888	88,327	88,769	89,213	89,659	90,107	90,558	91,011	91,466
40,409	40,611	40,814	41,018	41,223	41,429	41,637	41,845	42,054	42,264	42,476	42,688
14,922	14,997	15,072	15,147	15,223	15,299	15,375	15,452	15,529	15,607	15,685	15,764
10,101	10,151	10,202	10,253	10,304	10,356	10,407	10,459	10,512	10,564	10,617	10,670
7,130	7,165	7,201	7,237	7,273	7,310	7,346	7,383	7,420	7,457	7,494	7,532
14,121	14,192	14,263	14,334	14,406	14,478	14,550	14,623	14,696	14,769	14,843	14,917
173,265	174,132	175,002	175,877	176,757	177,640	178,529	179,421	180,318	181,220	182,126	183,037
8,663	8,707	8,750	8,794	8,838	8,882	8,926	8,971	9,016	9,061	9,106	9,152
22,736	22,850	22,964	23,079	23,194	23,310	23,427	23,544	23,661	23,780	23,899	24,018
8,053	8,093	8,134	8,174	8,215	8,256	8,297	8,339	8,381	8,423	8,465	8,507
4,697	4,721	4,745	4,768	4,792	4,816	4,840	4,864	4,889	4,913	4,938	4,962
8,053	8,093	8,134	8,174	8,215	8,256	8,297	8,339	8,381	8,423	8,465	8,507
52,202	52,463	52,726	52,989	53,254	53,520	53,788	54,057	54,327	54,599	54,872	55,146
38,313	38,313										
82,293	82,293										
$120,605	$120,605										
458	1,063	122,277	122,888	123,502	124,120	124,741	125,364	125,991	126,621	127,254	127,890
(3,071,701)	(3,070,638)	(2,948,361)	(2,825,473)	(2,701,971)	(2,577,851)	(2,453,110)	(2,327,746)	(2,201,755)	(2,075,134)	(1,947,880)	(1,819,990)

2030	2030	2031	2031	2031	2031
Q4	Q4	Q4	Q4	Q4	Q4
91,923	92,383	92,845	93,309	93,775	94,244
42,901	43,116	43,331	43,548	43,766	43,985
15,842	15,922	16,001	16,081	16,162	16,242
10,724	10,777	10,831	10,885	10,940	10,994
7,570	7,607	7,645	7,684	7,722	7,761
14,992	15,067	15,142	15,218	15,294	15,370
183,952	184,872	185,796	186,725	187,659	188,597
9,198	9,244	9,290	9,336	9,383	9,430
24,138	24,259	24,380	24,502	24,625	24,748
8,550	8,592	8,635	8,678	8,722	8,765
4,987	5,012	5,037	5,062	5,088	5,113
8,550	8,592	8,635	8,678	8,722	8,765
55,422	55,699	55,978	56,257	56,539	56,821
128,530	129,172	129,818	130,467	131,120	131,775
(1,691,460)	(1,562,287)	(1,432,469)	(1,302,002)	(1,170,882)	(1,039,106)

APPENDIX B: CASH FLOW WORKSHEETS FOR ALL SALES SCENARIO

All Sales Scenario | Wood Construction | Within Local Zoning Guidelines

TRANSIT-ORIENTED DEVELOPMENT FOR 50 COUNTRY WAY, GREENBUSH VILLAGE, SCITUATE, MA

Land area (s.f.)	61391
Gross Building Areas (s.f.)	41789
Floor Area Ratio (FAR)	0.68
Open Space (s.f.)	28010
Open Space %	46%
Allowable Units (20/40,000 s.f.)	31

Type	Total Units	Parking Required
1 br.	19	19
2 br.	9	13.5
3 br.	2	4
commercial	1630	5.4
	31	41.93

Condominiums for Sale	# of units	total s.f.	$/s.f.	Average s.f.	Avg. Price	sales / yr	quarters on market
New 1 bedroom	17	16767	282	986	$ 278,135	5	14
New 2 bedroom	6	7943	240	1324	$ 317,720	6	4
New 3 bedroom	2	3306	221	1653	$ 365,313	3	3
New commercial	1	1630	300	1630	$ 489,000	1	4
Existing 1 bedroom	2	1500	215	750	$ 161,250	2	4
Existing 2 bedroom	3	3100	205	1033	$ 211,833	2	6
	31	34246					

5 Year Cash Flow Analysis		Quarterly Cash Flow Analysis 2011-2016					
		2010	2010	2010	2010	2011	2011
Categories	Totals	Q1	Q2	Q3	Q4	Q1	Q2
REVENUES							
Earnest Money Deposits			$ 93,229	$ 93,229	$ 93,229	$ 93,229	$ 93,229
New 1 bedroom sales	$ 4,885,080			*1.75 year construction period*			
New 2 bedroom sales	$ 1,920,665						
New 3 bedroom sales	$ 734,285						
New commercial sale	$ 492,680						
Existing 1 bedroom sales	$ 324,927						
Existing 2 bedroom sales	$ 965,245						
gross revenues	$ 9,322,882	0	0	0	0	0	0
LOAN IN	$ 10,061,575	669,636	669,636	669,636	669,636	669,636	669,636
EXPENSES							
HARD COSTS							
Land Acquisition ($531k / Acre)	$ 748,361	748,361					
closing costs	$ 3,742	3,742					
Building Construction Costs	$ 3,848,733	549,819	549,819	549,819	549,819	549,819	549,819
Sitework							
Watershed treatment	$ 60,000	30,000	30,000				
Paving ($1,200 / stall)	$ 50,320						
Landscaping	$ 80,000						
SOFT COSTS							
Architectural Fee (6.6 % of construction)	$ 254,016	31,752	31,752	31,752	31,752	31,752	31,752
Contractor's Fee (25 % of construction)	$ 962,183	120,273	120,273	120,273	120,273	120,273	120,273
Project Management (4% of construction)	$ 153,949	19,244	19,244	19,244	19,244	19,244	19,244
Engineering (1% of construction)	$ 38,487	4,811	4,811	4,811	4,811	4,811	4,811
Legal & Permits (1% of construction)	$ 38,487	4,811	4,811	4,811	4,811	4,811	4,811
Real Estate Sales (5% of sales)	$ 466,144	0	0	0	0	0	0
total construction cost	$ 6,704,423	1,512,813	760,709	730,709	730,709	730,709	730,709
HOLDING COSTS							
Taxes	$ 64,653	1,490	1,497	1,505	1,512	1,520	1,527
Utilities	$ 38,507	3,726	3,745	3,763	3,782	3,801	3,820
Insurance/other	$ 21,354	1,200	1,206	1,212	1,218	1,224	1,230
Maintenance	$ 32,590	1,500	1,508	1,515	1,523	1,530	1,538
total holding costs	$ 157,103	7,916	7,955	7,995	8,035	8,075	8,116
CONSTRUCTION LOAN (6%)							
cash down payment	$ 670,442	670,442					
interest rate	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
interest only paid	$ 322,447	10,045	18,691	27,337	35,983	44,629	53,275
loan fees	$ 38,487	38,487					
loan drawdown		669,636	669,636	669,636	669,636	669,636	669,636
repayment	5,357,088	0	93,229	93,229	93,229	93,229	93,229
loan balance	$ -	669,636	1,246,043	1,822,450	2,398,858	2,975,265	3,551,672
total construction loan	$ 6,388,465	718,974	111,919	120,566	129,212	137,858	146,504
3 YEAR LOAN (5%)							
interest only payments	$ 390,989						
Principal payments	$ 4,704,487						
loan fees	$ 47,045	$ 47,045					
3yr loan expense	$ 5,142,520	$47,045	$0	$0	$0	$0	$0
NET CASH FLOW	$ 991,944	(1,617,111)	(210,948)	(189,634)	(198,320)	(207,006)	(215,693)
After Tax income	$ 793,555						
Total Cash Invested	$ 1,744,993	*Includes land acquisisiton, loan down payment, and interest.*					
5 yr return on Cash Investment	45%						
Average annual return	9%						

Village Business Overlay District:
20 units per 40,000 s.f.
20% open space
3 story limit
1 parking per 1 Bedroom
1.5 Parking stalls per 2 bedroom
2 Parking stalls per 3 bedroom
1 stall per 300s.f. commercial area

Building A: 1 Br. Units	
Unit	interior (s.f.)
106	951
107	955
108	1196
206	963
207	955
208	1185
306	958
307	958
308	1188
total 1br. s.f.	9309
1 br units	9

Building A: 2 Br. Apts	
Unit	interior (s.f.)
105	1331
109	1321
205	1328
209	1328
305	1316
309	1319
total 2br s.f.	7943
2 br. units:	6

2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1
$ 93,229	$ 93,229	$ 93,229	$ 93,229	$ 93,229						
	337,735	339,424	341,121	342,827	344,541	346,264	347,995	349,735	351,483	353,241
	476,580	478,963	481,358	483,765						
	243,542	244,760	245,984							
	122,250	122,861	123,476	124,093						
	80,625	81,028	81,433	81,840						
	158,875	159,669	160,468	161,270	162,076	162,887				
0	1,419,607	1,426,705	1,433,839	1,193,795	506,617	509,150	347,995	349,735	351,483	353,241
669,636	669,636	4,704,487	0	0						
549,819										
25,160	25,160									
	80,000									
31,752	31,752									
120,273	120,273									
19,244	19,244									
4,811	4,811									
4,811	4,811									
0	70,980	71,335	71,692	59,690	25,331	25,458	17,400	17,487	17,574	17,662
755,869	357,031	71,335	71,692	59,690	25,331	25,458	17,400	17,487	17,574	17,662
1,535	16,940	12,000	8,000	6,000	3,000	2,000	1,000	1,005	1,010	800
3,839	6,000	6,030								
1,236	3,500	3,518	2,000	1,500	1,508	400	402			
1,546	6,000	6,030	6,060	1,000	1,005	200	201	202	203	204
8,156	32,440	27,578	16,060	8,500	5,513	2,600	1,603	1,207	1,213	1,004
6.0%	6.0%									
61,921	70,567									
669,636	669,636									
93,229	93,229	4,704,487								
4,128,079	4,704,487	(loan balance paid off by new 3 year loan)								
155,150	163,796	4,704,487								
		32582	32582	32582	32582	32582	32582	32582	32582	32582
		392041	392041	392041	392041	392041	392041	392041	392041	392041
$0	$0	$424,623	$424,623	$424,623	$424,623	$424,623	$424,623	$424,623	$424,623	$424,623
(249,540)	1,535,976	903,170	921,464	700,982	51,151	56,470	(95,631)	(93,582)	(91,927)	(90,048)

Building B: 1 Br. Units	
Unit	interior (s.f.)
103	930
104	859
203	1121
204	869
301	900
302	883
303	1033
304	863
total 1 br. s.f.	7458
2br. Units	8

Building B: 3 Bedroom Apts.	
Unit	int. (s.f.)
101	1630
201	1676
total s.f.	3306
3 br units:	2

Building C: Commercial Unit	
Unit	int. (s.f.)
100	1630
total commercial s.f.	1630
Commercial units:	1

Existing Building	
2 bedroom units:	3
1 bedroom units:	2
2 bedroom s.f.	3100
1 bedroom s.f.	1500

2014 Q2	2014 Q3	2014 Q4	2015 Q1
355,007	356,782	358,566	360,359
355,007	356,782	358,566	360,359
17,750	17,839	17,928	18,018
17,750	17,839	17,928	18,018
804	500	503	505
205	206	207	208
1,009	706	710	713
32582	32582	32582	
392041	392041	392041	
$424,623	$424,623	$424,623	$0
(88,375)	(86,386)	(84,695)	341,628

Construction Cost Data

Building A	Gross Area	Perimeter	Floor Height
Level 1	7097	437'	10'
Level 2	7097		
Level 3	7097		
	21291	gross s.f.	

Construction Type: 3 Story Wood Frame/Wood Siding

Construction Cost per Square Foot 100.78 *

Building Cost **$ 2,145,707**

Building B	Gross Area	Perimeter
Level 1	4667	345'
Level 2	4667	
Level 3	4667	
	14001	gross s.f.

Construction Type: 3 Story Wood Frame

Construction Cost per Square Foot

Building Cost

Building C	Gross Area	Perimeter	Floor Height
Level 1	1649	179	10'
	1649	gross s.f.	

Construction Type: 1 Story Wood Frame/Wood Siding

Construction Cost per Square Foot 177.08 *

Building Cost **$ 292,005**

Existing	Gross Area	Perimeter
Level 1	2424	295'
Level 2	2424	
	4848	gross s.f.

Construction Type: 2 Story Wood Frame

**Overall Square Foot Cost including Soft Costs* *$ 195.77*

APPENDIX C: CASH FLOW WORKSHEETS FOR A MIX OF RENTALS AND SALES SCENARIO

Mix of Rentals and Sales Scenario

TRANSIT-ORIENTED DEVELOPMENT FOR 50 COUNTRY WAY, GREENBUSH VILLAGE, SCITUATE, MA

Land area (s.f.)	61391
Gross Building Areas (s.f.)	41789
Floor Area Ratio (FAR)	0.68
Open Space (s.f.)	28010
Open Space %	46%
Allowable Units (20/40,000 s.f.)	31

Apartments for Rent	# of units	total s.f.	$/s.f./mo	Avg. s.f.	Avg Rent
new 1 bedroom	8	7458	1.35	932	$ 1,259
new 3 bedroom	2	3306	1.18	1653	$ 1,951
new commercial	1	1630	1.62	1630	$ 2,641
Existing 1 bedroom	2	1500	1.2	750	$ 900
Existing 2 bedroom	3	3100	1.15	1033	$ 1,188
	16	16994		Vacancy	5%
				Inflation/yr	2%

Condominiums for Sale (Building A)	# of units	total s.f.	$/s.f.	Average s.f.	Avg. Price	sales / yr	quarters on market
new 1 bedroom	9	9309	282	1034	$ 291,682	5	7
new 2 bedroom	6	7943	240	1324	$ 317,720	6	4
	15	17252					

20 Year Cash Flow Analysis		2011	2011	2011	2011	2012	2012	2012
Categories	Totals	Q1	Q2	Q3	Q4	Q1	Q2	Q3
REVENUES								
Earnest Money Deposits			$ 45,855	$ 45,855	$ 45,855	$ 45,855	$ 45,855	$ 45,855
New 1 bedroom sales	$ 2,664,845			*1.75 year construction period*				
New 2 bedroom sales	$ 1,920,665							
total sales	$ 4,585,510							
New 1 bedroom rentals	$ 2,686,997							
New 3 bedroom rentals	$ 1,041,108							
New commercial lease	$ 704,715							
Existing 1 bedroom rentals	$ 533,899	5,130	5,156	5,181	5,207	5,233	5,260	5,286
Existing 2 bedroom rentals	$ 1,057,417	10,160	10,211	10,262	10,313	10,365	10,417	10,469
total rentals	$ 6,024,137	15,290	15,367	15,444	15,521	15,598	15,676	15,755
LOAN IN	$ 7,669,891	701,806	701,806	701,806	701,806	701,806	701,806	701,806
EXPENSES								
HARD COSTS								
Land Acquisition ($531k / Acre)	$ 748,361	748,361						
closing costs	$ 3,742	3,742						
Building Construction Costs	$ 3,848,733	549,819	549,819	549,819	549,819	549,819	549,819	549,819
Sitework								
Watershed treatment	$ 60,000	30,000	30,000					
Paving ($1,200 / stall)	$ 50,320							25,160
Landscaping	$ 80,000							
SOFT COSTS								
Architectural Fee (6.6 % of construction)	$ 254,016	31,752	31,752	31,752	31,752	31,752	31,752	31,752
Contractor's Fee (25 % of construction)	$ 962,183	120,273	120,273	120,273	120,273	120,273	120,273	120,273
Project Management (4% of construction)	$ 153,949	19,244	19,244	19,244	19,244	19,244	19,244	19,244
Engineering (1% of construction)	$ 38,487	4,811	4,811	4,811	4,811	4,811	4,811	4,811
Legal & Permits (1% of construction)	$ 38,487	4,811	4,811	4,811	4,811	4,811	4,811	4,811
total construction cost	$ 6,238,279	1,512,813	760,709	730,709	730,709	730,709	730,709	755,869
HOLDING COSTS								
Real Estate Management (5% of rent)	$ 301,207	765	768	772	776	780	784	788
Real Estate Sales (5% of sales)	$ 229,275	0	0	0	0	0	0	0
Taxes	$ 799,488	1,490	1,497	1,505	1,512	1,520	1,527	1,535
Utilities	$ 588,323	3,726	3,745	3,763	3,782	3,801	3,820	3,839
Insurance/other	$ 242,630	1,200	1,206	1,212	1,218	1,224	1,230	1,236
Maintenance	$ 290,082	1,500	1,508	1,515	1,523	1,530	1,538	1,546
total holding costs	$ 2,451,005	8,680	8,724	8,767	8,811	8,855	8,899	8,944
CONSTRUCTION LOAN (6%)								
cash down payment	$ 623,828	623,828						
interest rate	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
interest only paid	$ 378,975	10,527	21,054	31,581	42,108	52,635	63,163	73,690
loan fees (1%)	$ -	0						
loan drawdown		701,806	701,806	701,806	701,806	701,806	701,806	701,806
repayment	5,614,451	0	0	0	0	0	0	0
loan balance		701,806	1,403,613	2,105,419	2,807,226	3,509,032	4,210,839	4,912,645
total construction loan	$ 1,002,803							
15 YEAR LOAN (5%)								
interest payments	$ 979,120							
principal payments	$ 2,055,440							
loan fees	$ 56,145							
total loan expense	$ 9,651,815	$634,355	$21,054	$31,581	$42,108	$52,635	$63,163	$73,690
NET CASH FLOW	$ (63,061)	(1,438,751)	(73,314)	(53,808)	(64,302)	(74,795)	(85,289)	(120,942)
cash balance		(1,438,751)	(1,512,065)	(1,565,873)	(1,630,175)	(1,704,970)	(1,790,259)	(1,911,201)
After Tax income	$ (50,448)							
Total Cash Invested	$ 1,817,967	*Includes land acquisisiton, loan down payment, interest, and negative cash flow paid out of pocket*						
Leftover Assets	$ 4,894,272	*20% added for 2031 value*						
Net Assets and Cash	$ 4,831,211	*net cash plus present value of properties*						
20 yr return on Cash Investment	266%							
Average annual return	13%							

Village Business Overlay District:
20 units per 40,000 s.f.
20% open space
3 story limit
1 parking per 1 Bedroom
1.5 Parking stalls per 2 bedroom
2 Parking stalls per 3 bedroom
1 stall per 300s.f. commercial area

Building A: 1 Br. Units	
Unit	interior (s.f.)
106	951
107	955
108	1196
206	963
207	955
208	1185
306	958
307	958
308	1188
total 1br. s.f.	9309
1 br units	9

Building A: 2 Br. Apts	
Unit	interior (s.f.)
105	1331
109	1321
205	1328
209	1328
305	1316
309	1319
total 2br s.f.	7943
2 br. units:	6

Building B: 1
Unit
103
104
203
204
301
302
303
304
total 1 br. s.
2br. Units

2012	2013	2013	2013	2013	2014	2014	2014	2014	2015	2015
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
$ 45,855	$ 45,855	$ 45,855	$ 45,855							
375,020	376,895	378,779	380,673	382,577	384,489	386,412				
476,580	478,963	481,358	483,765							
851,600	855,858	860,137	864,438	382,577	384,489	386,412				
28,695	28,838	28,982	29,127	29,273	29,419	29,566	29,714	29,863	30,012	30,162
11,118	11,174	11,230	11,286	11,342	11,399	11,456	11,513	11,571	11,629	11,687
7,526	7,563	7,601	7,639	7,677	7,716	7,754	7,793	7,832	7,871	7,911
5,312	5,339	5,366	5,392	5,419	5,446	5,474	5,501	5,529	5,556	5,584
10,521	10,574	10,627	10,680	10,733	10,787	10,841	10,895	10,950	11,004	11,059
63,172	63,488	63,805	64,124	64,445	64,767	65,091	65,416	65,743	66,072	66,403
701,806	2,055,440	0	0							
25,160										
80,000										
31,752										
120,273										
19,244										
4,811										
4,811										
286,050										
3,159	3,174	3,190	3,206	3,222	3,238	3,255	3,271	3,287	3,304	3,320
42,580	42,793	43,007	43,222	19,129	19,224	19,321	0	0	0	0
16,940	17,025	17,110	17,195	17,281	17,368	17,455	8,000	8,040	8,080	8,121
6,000	6,030	6,060	6,090	6,121	6,152	6,182	6,213	6,244	6,275	6,307
2,500	2,513	2,525	2,538	2,550	2,563	2,576	2,589	2,602	2,615	2,628
3,000	3,015	3,030	3,045	3,060	3,076	3,091	3,107	3,122	3,138	3,153
74,179	74,549	74,922	75,297	51,364	51,621	51,879	23,179	23,295	23,412	23,529
6.0%										
84,217										
701,806										
0	5,614,451									
5,614,451	(loan balance paid off by new 15 year loan)									
	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319
	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257
$84,217	$5,665,027	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576
1,172,132	(2,764,791)	798,444	802,689	345,081	347,060	349,048	(8,339)	(8,128)	(7,916)	(7,702)
(739,068)	(3,503,860)	(2,705,416)	(1,902,727)	(1,557,645)	(1,210,586)	(861,538)	(869,877)	(878,005)	(885,920)	(893,623)

. Br. Units	
interior (s.f.)	
930	
859	
1121	
869	
900	
883	
1033	
863	
7458	
8	

Building B: 3 Bedroom Apts.	
Unit	int. (s.f.)
101	1630
201	1676
total s.f.	3306
3 br units:	2

Building C: Commercial Unit		
Unit		int. (s.f.)
100		1630
total commercial s.f.		1630
Commercial units:		1

Existing Building	
2 bedroom units:	3
1 bedroom units:	2
2 bedroom s.f.	3100
1 bedroom s.f.	1500

parking		
Unit type	# units	Parking Required
1 br.	19	19
2 br.	9	13.5
3 br.	2	4
commercial	1630	5.4
	31	41.93

Quarterly Cash Flow Analysis 2011-2031

2015 Q3	2015 Q4	2016 Q1	2016 Q2	2016 Q3	2016 Q4	2017 Q1	2017 Q2	2017 Q3	2017 Q4	2018 Q1	2018 Q2	2018 Q3
30,313	30,464	30,617	30,770	30,924	31,078	31,234	31,390	31,547	31,705	31,863	32,022	32,183
11,745	11,804	11,863	11,922	11,982	12,042	12,102	12,162	12,223	12,284	12,346	12,407	12,470
7,950	7,990	8,030	8,070	8,110	8,151	8,192	8,233	8,274	8,315	8,357	8,398	8,440
5,612	5,640	5,668	5,696	5,725	5,754	5,782	5,811	5,840	5,869	5,899	5,928	5,958
11,115	11,170	11,226	11,282	11,339	11,395	11,452	11,509	11,567	11,625	11,683	11,741	11,800
66,735	67,068	67,404	67,741	68,079	68,420	68,762	69,106	69,451	69,798	70,147	70,498	70,851
3,337	3,353	3,370	3,387	3,404	3,421	3,438	3,455	3,473	3,490	3,507	3,525	3,543
0	0	0	0	0	0	0	0	0	0			
8,161	8,202	8,243	8,284	8,326	8,367	8,409	8,451	8,493	8,536	8,579	8,621	8,665
6,338	6,370	6,402	6,434	6,466	6,498	6,531	6,564	6,596	6,629	6,663	6,696	6,729
2,641	2,654	2,667	2,681	2,694	2,708	2,721	2,735	2,748	2,762	2,776	2,790	2,804
3,169	3,185	3,201	3,217	3,233	3,249	3,265	3,282	3,298	3,315	3,331	3,348	3,365
23,646	23,765	23,884	24,003	24,123	24,244	24,365	24,487	24,609	24,732	24,856	24,980	25,105
16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319
34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257
$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576
(7,488)	(7,272)	(7,056)	(6,838)	(6,620)	(6,400)	(6,179)	(5,957)	(5,734)	(5,510)	(5,284)	(5,058)	(4,830)
(901,111)	(908,383)	(915,439)	(922,277)	(928,897)	(935,297)	(941,476)	(947,433)	(953,167)	(958,677)	(963,961)	(969,019)	(973,849)

Building A	Gross Area	Perimeter	Floor Height
Level 1	7097	437'	10'
Level 2	7097		
Level 3	7097		
	21291	gross s.f.	
Construction Type: 3 Story Wood Frame/Wood Siding			
Construction Cost per Square Foot			100.78
Building Cost			$ 2,145,707

Building B	Gross Area	Perimeter	Floor Height
Level 1	4667	345'	10'
Level 2	4667		
Level 3	4667		
	14001	gross s.f.	
Construction Type: 3 Story Wood Frame/Wood Siding			
Construction Cost per Square Foot			100.78
Building Cost			$ 1,411,021

Building C	Gross Area	Perimeter	Floor Height
Level 1	1649	179	10'
	1649	gross s.f.	
Construction Type: 1 Story Wood Frame/Wood Siding			
Construction Cost per Square Foot			177.08
Building Cost			$ 292,005

Existing	Gross Area	Perimeter	Floor Height
Level 1	2424	295'	10'
Level 2	2424		
	4848	gross s.f.	
Construction Type: 2 Story Wood Frame/Wood Siding			

2018	2019	2019	2019	2019	2020	2020	2020	2020	2021	2021	2021
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
32,343	32,505	32,668	32,831	32,995	33,160	33,326	33,493	33,660	33,828	33,998	34,167
12,532	12,595	12,657	12,721	12,784	12,848	12,913	12,977	13,042	13,107	13,173	13,239
8,483	8,525	8,568	8,611	8,654	8,697	8,740	8,784	8,828	8,872	8,916	8,961
5,988	6,018	6,048	6,078	6,108	6,139	6,170	6,201	6,232	6,263	6,294	6,325
11,859	11,918	11,978	12,038	12,098	12,159	12,219	12,280	12,342	12,404	12,466	12,528
71,205	71,561	71,919	72,278	72,640	73,003	73,368	73,735	74,103	74,474	74,846	75,221
3,560	3,578	3,596	3,614	3,632	3,650	3,668	3,687	3,705	3,724	3,742	3,761
8,708	8,751	8,795	8,839	8,883	8,928	8,972	9,017	9,062	9,108	9,153	9,199
6,763	6,797	6,831	6,865	6,899	6,934	6,968	7,003	7,038	7,073	7,109	7,144
2,818	2,832	2,846	2,860	2,875	2,889	2,904	2,918	2,933	2,947	2,962	2,977
3,381	3,398	3,415	3,432	3,450	3,467	3,484	3,502	3,519	3,537	3,554	3,572
25,230	25,357	25,483	25,611	25,739	25,868	25,997	26,127	26,258	26,389	26,521	26,653
16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319
34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257
$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576
(4,602)	(4,372)	(4,141)	(3,909)	(3,675)	(3,441)	(3,205)	(2,968)	(2,730)	(2,491)	(2,250)	(2,009)
(978,451)	(982,822)	(986,963)	(990,872)	(994,547)	(997,988)	(1,001,193)	(1,004,161)	(1,006,891)	(1,009,382)	(1,011,632)	(1,013,641)

2021	2022	2022	2022	2022	2023	2023	2023	2023	2024	2024	2024	2024
Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
							Quarterly Cash Flow Analysis 2011-2031					
34,338	34,510	34,683	34,856	35,030	35,205	35,381	35,558	35,736	35,915	36,094	36,275	36,456
13,305	13,371	13,438	13,505	13,573	13,641	13,709	13,777	13,846	13,916	13,985	14,055	14,125
9,006	9,051	9,096	9,142	9,187	9,233	9,279	9,326	9,372	9,419	9,466	9,514	9,561
6,357	6,389	6,421	6,453	6,485	6,518	6,550	6,583	6,616	6,649	6,682	6,716	6,749
12,591	12,654	12,717	12,780	12,844	12,908	12,973	13,038	13,103	13,169	13,234	13,301	13,367
75,597	75,975	76,354	76,736	77,120	77,506	77,893	78,283	78,674	79,067	79,463	79,860	80,259
3,780	3,799	3,818	3,837	3,856	3,875	3,895	3,914	3,934	3,953	3,973	3,993	4,013
9,245	9,291	9,338	9,384	9,431	9,478	9,526	9,573	9,621	9,669	9,718	9,766	9,815
7,180	7,216	7,252	7,288	7,325	7,361	7,398	7,435	7,472	7,510	7,547	7,585	7,623
2,992	3,007	3,022	3,037	3,052	3,067	3,083	3,098	3,113	3,129	3,145	3,160	3,176
3,590	3,608	3,626	3,644	3,662	3,681	3,699	3,718	3,736	3,755	3,774	3,793	3,811
26,787	26,921	27,055	27,190	27,326	27,463	27,600	27,738	27,877	28,016	28,157	28,297	28,439
16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319
34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257
$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576
(1,766)	(1,522)	(1,277)	(1,030)	(782)	(533)	(283)	(32)	221	475	730	987	1,244
(1,015,407)	(1,016,929)	(1,018,206)	(1,019,236)	(1,020,018)	(1,020,552)	(1,020,835)	(1,020,867)	(1,020,646)	(1,020,171)	(1,019,441)	(1,018,454)	(1,017,210)

2025	2025	2025	2025	2026	2026	2026	2026	2027	2027	2027	2027
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

Quarterly Cash Flow Analysis 2011-2031

36,639	36,822	37,006	37,191	37,377	37,564	37,752	37,940	38,130	38,321	38,512	38,705
14,196	14,267	14,338	14,410	14,482	14,554	14,627	14,700	14,774	14,848	14,922	14,997
9,609	9,657	9,705	9,754	9,803	9,852	9,901	9,951	10,000	10,050	10,101	10,151
6,783	6,817	6,851	6,885	6,920	6,954	6,989	7,024	7,059	7,094	7,130	7,165
13,434	13,501	13,569	13,636	13,705	13,773	13,842	13,911	13,981	14,051	14,121	14,192
80,661	81,064	81,469	81,877	82,286	82,697	83,111	83,526	83,944	84,364	84,786	85,209
4,033	4,053	4,073	4,094	4,114	4,135	4,156	4,176	4,197	4,218	4,239	4,260
9,864	9,914	9,963	10,013	10,063	10,113	10,164	10,215	10,266	10,317	10,369	10,421
7,661	7,699	7,738	7,777	7,815	7,855	7,894	7,933	7,973	8,013	8,053	8,093
3,192	3,208	3,224	3,240	3,256	3,273	3,289	3,306	3,322	3,339	3,355	3,372
3,831	3,850	3,869	3,888	3,908	3,927	3,947	3,967	3,986	4,006	4,026	4,047
28,581	28,724	28,867	29,012	29,157	29,303	29,449	29,596	29,744	29,893	30,043	30,193
16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319	16,319
34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257	34,257
$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576	$50,576
1,504	1,764	2,026	2,289	2,553	2,819	3,086	3,354	3,624	3,895	4,167	4,441
(1,015,706)	(1,013,942)	(1,011,916)	(1,009,628)	(1,007,075)	(1,004,256)	(1,001,170)	(997,816)	(994,193)	(990,298)	(986,131)	(981,691)

2028	2028	2028	2028	2029	2029	2029	2029	2030	2030	2030	2030	2031
Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4	Q4

Quarterly Cash Flow Analysis 2011-2031

38,898	39,093	39,288	39,485	39,682	39,881	40,080	40,280	40,482	40,684	40,888	41,092	41,297
15,072	15,147	15,223	15,299	15,375	15,452	15,529	15,607	15,685	15,764	15,842	15,922	16,001
10,202	10,253	10,304	10,356	10,407	10,459	10,512	10,564	10,617	10,670	10,724	10,777	10,831
7,201	7,237	7,273	7,310	7,346	7,383	7,420	7,457	7,494	7,532	7,570	7,607	7,645
14,263	14,334	14,406	14,478	14,550	14,623	14,696	14,769	14,843	14,917	14,992	15,067	15,142
85,636	86,064	86,494	86,927	87,361	87,798	88,237	88,678	89,122	89,567	90,015	90,465	90,917
4,282	4,303	4,325	4,346	4,368	4,390	4,412	4,434	4,456	4,478	4,501	4,523	4,546
10,473	10,525	10,578	10,631	10,684	10,737	10,791	10,845	10,899	10,953	11,008	11,063	11,119
8,134	8,174	8,215	8,256	8,297	8,339	8,381	8,423	8,465	8,507	8,550	8,592	8,635
3,389	3,406	3,423	3,440	3,457	3,475	3,492	3,509	3,527	3,545	3,562	3,580	3,598
4,067	4,087	4,108	4,128	4,149	4,169	4,190	4,211	4,232	4,253	4,275	4,296	4,318
30,344	30,495	30,648	30,801	30,955	31,110	31,266	31,422	31,579	31,737	31,896	32,055	32,215
55,292	55,568	55,846	56,125	56,406	56,688	56,971	57,256	57,543	57,830	58,119	58,410	58,702
(926,399)	(870,831)	(814,985)	(758,859)	(702,453)	(645,765)	(588,794)	(531,538)	(473,995)	(416,165)	(358,046)	(299,636)	(240,934)

2031	2031	2031
Q4	Q4	Q4
41,504	41,711	41,920
16,081	16,162	16,242
10,885	10,940	10,994
7,684	7,722	7,761
15,218	15,294	15,370
91,372	91,829	92,288
4,569	4,591	4,614
11,174	11,230	11,286
8,678	8,722	8,765
3,616	3,634	3,652
4,339	4,361	4,383
32,376	32,538	32,701
58,996	59,291	59,587
(181,938)	(122,648)	(63,061)

APPENDIX D: CONSTRUCTION COST REPORTS: APARTMENT 1-3 STORY AND RESTAURANT

Square Foot Cost Estimate Report

Estimate Name: **Scheme 1 Building A largest**

Building Type:	**Apartment, 1-3 Story with Wood Siding / Wood Frame**
Location:	BUZZARDSBAY, MA
Stories Count (L.F.):	**3.00**
Stories Height	**10.00**
Floor Area (S.F.):	**21,290.00**
LaborType	**Open Shop**
Basement Included:	No
Data Release:	**Year 2010 Quarter 3**
Cost Per Square Foot	**$100.78**
Total Building Cost	**$2,145,500**

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per SF	Cost
A Substructure		**4.4%**	**4.46**	**$95,000**
A1010	**Standard Foundations**		**0.92**	**$19,500**
	Strip footing, concrete, reinforced, load 14.8 KLF, soil bearing capacity 6 KSF, 12" deep x 32" wide			
	Strip footing, concrete, reinforced, load 18.4 KLF, soil bearing capacity 6 KSF, 12" deep x 40" wide			
A1030	**Slab on Grade**		**1.97**	**$42,000**
	Slab on grade, 4" thick, light industrial, reinforced			
A2010	**Basement Excavation**		**0.07**	**$1,500**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**1.50**	**$32,000**
	Foundation wall, CIP, 4 wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
	Foundation wall, CIP, 4 wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**16.9%**	**17.07**	**$363,500**
B1010	**Floor Construction**		**2.54**	**$54,000**
	Floor, wood joist, 2 x 12 @12" O.C., 1/2" CDX subfloor			
B1020	**Roof Construction**		**2.09**	**$44,500**
	Wood roof, truss, 4/12 slope, 24" O.C., 30' to 43' span			
B2010	**Exterior Walls**		**6.72**	**$143,000**
	Wood siding, 2"x6" studs 16"OC, insulated wall, 1" x 5" rabbetted cedar bevel siding			
B2020	**Exterior Windows**		**4.11**	**$87,500**
	Windows, aluminum, sliding, standard glass, 5' x 3'			
B2030	**Exterior Doors**		**0.35**	**$7,500**
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-6" x 7'-0" opening			
B3010	**Roof Coverings**		**1.27**	**$27,000**
	Asphalt roofing, strip shingles, premium laminated, multi-layered, Class A, 4" slope, 260-300 lbs/SQ			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
C Interiors		**29.4%**	**29.66**	**$631,500**
C1010	**Partitions**		**7.66**	**$163,000**

		% of Total	Cost Per SF	Cost
	Metal partition, 5/8"fire rated gypsum board face, 1/4" sound deadening gypsum board, 2-1/2" @ 24", same opposite			
	1/2" fire ratedgypsum board, taped & finished, painted on metal furring			
C1020	**Interior Doors**		**6.62**	**$141,000**
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, solid core			
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, hollow core			
C1030	**Fittings**		**2.75**	**$58,500**
	Cabinets, residential, wall, two doors x 48" wide			
C2010	**Stair Construction**		**0.66**	**$14,000**
	Stairs, wood, prefab box type, oak treads, wood rails 3'-6" wide, 14 risers			
C3010	**Wall Finishes**		**2.61**	**$55,500**
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		**5.07**	**$108,000**
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 24 oz			
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 35 oz			
	Carpet, padding, add to above, minimum			
	Carpet, padding, add to above, maximum			
	Vinyl, composition tile, minimum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		**4.30**	**$91,500**
	Gypsum board ceilings, 1/2" fire rated gypsum board, painted and texturedfinish, 7/8"resilient channel furring, 24" O			
D Services		**49.2%**	**49.58**	**$1,055,500**
D1010	**Elevators and Lifts**		**4.93**	**$105,000**
	Hydraulic passenger elevator, 3500 lb., 3 floors, 10' story height, 125 FPM			
D2010	**Plumbing Fixtures**		**12.07**	**$257,000**
	Kitchen sink w/trim, countertop, PE on CI, 24" x 21", single bowl			
	Laundry sink w/trim, PE on CI, black iron frame, 24" x 20", single compt			
	Service sink w/trim, PE on CI, corner floor, 28" x 28", w/rim guard			
	Bathroom, lavatory & water closet, 2 wall plumbing, stand alone			
	Bathroom, three fixture, 2 wall plumbing, lavatory, water closet & bathtub, stand alone			
D2020	**Domestic Water Distribution**		**3.90**	**$83,000**
	Gas fired water heater, residential, 100< F rise, 30 gal tank, 32 GPH			
D2040	**Rain Water Drainage**		**0.35**	**$7,500**
	Roof drain, DWV PVC, 4" diam, diam, 10' high			
	Roof drain, DWV PVC, 4" diam, for each additional foot add			
D3010	**Energy Supply**		**7.07**	**$150,500**
	Apartment building heating system, fin tube radiation, forced hot water, 20,000 SF area,200,000 CF vol			
D3030	**Cooling Generating Systems**		**8.08**	**$172,000**
	Packaged chiller, air cooled, with fan coil unit, medical centers, 20,000 SF, 46.66 ton			
D4010	**Sprinklers**		**2.91**	**$62,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 5000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 5000 SF			
D5010	**Electrical Service/Distribution**		**2.54**	**$54,000**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 600 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 600 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 600 A			
D5020	**Lighting and Branch Wiring**		**6.27**	**$133,500**
	Receptacles incl plate, box, conduit, wire, 10 per 1000 SF, 1.2 watts per SF			

		% of Total	Cost Per SF	Cost
	Wall switches, 2.5 per 1000 SF			
	Miscellaneous power, 2 watts			
	Central air conditioning power, 3 watts			
	Motor installation, three phase, 200 V, 15 HP motor size			
	Incandescent fixtures recess mounted, type A, 1 watt per SF, 8 FC, 6 fixtures per 1000 SF			
D5030	**Communications and Security**		1.27	$27,000
	Communication and alarm systems, fire detection, non-addressable, 25 detectors, includes outlets, boxes, conduit a			
	Internet wiring, 2 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		0.19	$4,000
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 7			
E Equipment & Furnishings		0.0%	0.00	$0
E1090	**Other Equipment**		0.00	$0
F Special Construction		0.0%	0.00	$0
G Building Sitework		0.0%	0.00	$0
Sub Total		100%	$100.78	$2,145,500
Contractor's Overhead & Profit		0.0%	$0.00	$0
Architectural Fees		0.0%	$0.00	$0
User Fees		0.0%	$0.00	$0
Total Building Cost			**$100.78**	**$2,145,500**

Square Foot Cost Estimate Report

Estimate Name: **Scheme 1 Building B**

Building Type:	**Apartment, 1-3 Story with Wood Siding / Wood Frame**
Location:	BROCKTON, MA
Stories Count (L.F.):	**3.00**
Stories Height	**10.00**
Floor Area (S.F.):	**14,001.00**
LaborType	**Open Shop**
Basement Included:	No
Data Release:	**Year 2010 Quarter 3**
Cost Per Square Foot	**$116.78**
Total Building Cost	**$1,635,000**

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per SF	Cost
A Substructure		**4.8%**	**5.57**	**$78,000**
A1010	**Standard Foundations**		**1.29**	**$18,000**
	Strip footing, concrete, reinforced, load 14.8 KLF, soil bearing capacity 6 KSF, 12" deep x 32" wide			
	Strip footing, concrete, reinforced, load 18.4 KLF, soil bearing capacity 6 KSF, 12" deep x 40" wide			
A1030	**Slab on Grade**		**2.14**	**$30,000**
	Slab on grade, 4" thick, light industrial, reinforced			
A2010	**Basement Excavation**		**0.07**	**$1,000**
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**2.07**	**$29,000**
	Foundation wall, CIP, 4 wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
	Foundation wall, CIP, 4 wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**18.8%**	**21.89**	**$306,500**
B1010	**Floor Construction**		**2.71**	**$38,000**
	Floor, wood joist, 2 x 12 @12" O.C., 1/2" CDX subfloor			
B1020	**Roof Construction**		**2.25**	**$31,500**
	Wood roof, truss, 4/12 slope, 24" O.C., 30' to 43' span			
B2010	**Exterior Walls**		**9.36**	**$131,000**
	Wood siding, 2"x6" studs 16"OC, insulated wall, 1" x 5" rabbetted cedar bevel siding			
B2020	**Exterior Windows**		**5.79**	**$81,000**
	Windows, aluminum, sliding, standard glass, 5' x 3'			
B2030	**Exterior Doors**		**0.39**	**$5,500**
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-6" x 7'-0" opening			
B3010	**Roof Coverings**		**1.39**	**$19,500**
	Asphalt roofing, strip shingles, premium laminated, multi-layered, Class A, 4" slope, 260-300 lbs/SQ			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
C Interiors		**26.6%**	**31.10**	**$435,500**
C1010	**Partitions**		**8.46**	**$118,500**

		% of Total	Cost Per SF	Cost
	Metal partition, 5/8"fire rated gypsum board face, 1/4" sound deadening gypsum board, 2-1/2" @ 24", same opposite			
	1/2" fire ratedgypsum board, taped & finished, painted on metal furring			
C1020	**Interior Doors**		**6.12**	**$95,500**
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, solid core			
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, hollow core			
C1030	**Fittings**		**2.56**	**$40,000**
	Cabinets, residential, wall, two doors x 48" wide			
C2010	**Stair Construction**		**0.68**	**$9,500**
	Stairs, wood, prefab box type, oak treads, wood rails 3'-6" wide, 14 risers			
C3010	**Wall Finishes**		**2.68**	**$37,500**
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		**5.25**	**$73,500**
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 24 oz			
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 35 oz			
	Carpet, padding, add to above, minimum			
	Carpet, padding, add to above, maximum			
	Vinyl, composition tile, minimum			
	Vinyl, composition tile, maximum			
	Tile, ceramic natural clay			
C3030	**Ceiling Finishes**		**4.36**	**$61,000**
	Gypsum board ceilings, 1/2" fire rated gypsum board, painted and texturedfinish, 7/8"resilient channel furring, 24" O			
D Services		**49.9%**	**58.21**	**$815,000**
D1010	**Elevators and Lifts**		**4.93**	**$69,000**
	Hydraulic passenger elevator, 3500 lb., 3 floors, 10' story height, 125 FPM			
D2010	**Plumbing Fixtures**		**16.14**	**$226,000**
	Kitchen sink w/trim, countertop, PE on CI, 24" x 21", single bowl			
	Laundry sink w/trim, PE on CI, black iron frame, 24" x 20", single compt			
	Service sink w/trim, PE on CI, corner floor, 28" x 28", w/rim guard			
	Bathroom, lavatory & water closet, 2 wall plumbing, stand alone			
	Bathroom, three fixture, 2 wall plumbing, lavatory, water closet & bathtub, stand alone			
D2020	**Domestic Water Distribution**		**6.11**	**$85,500**
	Gas fired water heater, residential, 100< F rise, 30 gal tank, 32 GPH			
D2040	**Rain Water Drainage**		**0.57**	**$8,000**
	Roof drain, DWV PVC, 4" diam, diam, 10' high			
	Roof drain, DWV PVC, 4" diam, for each additional foot add			
D3010	**Energy Supply**		**7.25**	**$101,500**
	Apartment building heating system, fin tube radiation, forced hot water, 20,000 SF area,200,000 CF vol			
D3030	**Cooling Generating Systems**		**8.32**	**$116,500**
	Packaged chiller, air cooled, with fan coil unit, medical centers, 20,000 SF, 46.66 ton			
D4010	**Sprinklers**		**3.00**	**$42,000**
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 5000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 5000 SF			
D5010	**Electrical Service/Distribution**		**3.96**	**$55,500**
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 600 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 600 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 600 A			
D5020	**Lighting and Branch Wiring**		**6.43**	**$90,000**
	Receptacles incl plate, box, conduit, wire, 10 per 1000 SF, 1.2 watts per SF			

		% of Total	Cost Per SF	Cost
	Wall switches, 2.5 per 1000 SF			
	Miscellaneous power, 2 watts			
	Central air conditioning power, 3 watts			
	Motor installation, three phase, 200 V, 15 HP motor size			
	Incandescent fixtures recess mounted, type A, 1 watt per SF, 8 FC, 6 fixtures per 1000 SF			
D5030	**Communications and Security**		1.29	$18,000
	Communication and alarm systems, fire detection, non-addressable, 25 detectors, includes outlets, boxes, conduit a			
	Internet wiring, 2 data/voice outlets per 1000 S.F.			
D5090	**Other Electrical Systems**		0.21	$3,000
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 7			
E Equipment & Furnishings		0.0%	0.00	$0
E1090	**Other Equipment**		0.00	$0
F Special Construction		0.0%	0.00	$0
G Building Sitework		0.0%	0.00	$0
Sub Total		100%	$116.78	$1,635,000
Contractor's Overhead & Profit		0.0%	$0.00	$0
Architectural Fees		0.0%	$0.00	$0
User Fees		0.0%	$0.00	$0
Total Building Cost			**$116.78**	**$1,635,000**

Square Foot Cost Estimate Report

Estimate Name: **Scheme 1 Building C**

Building Type:	**Restaurant with Wood Siding / Wood Frame**
Location:	BUZZARDSBAY, MA
Stories Count (L.F.):	**1.00**
Stories Height	**12.00**
Floor Area (S.F.):	**1,649.00**
LaborType	**Open Shop**
Basement Included:	No
Data Release:	**Year 2010 Quarter 3**
Cost Per Square Foot	**$177.08**
Total Building Cost	**$292,000**

Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.
Parameters are not within the ranges recommended by RSMeans.

		% of Total	Cost Per SF	Cost
A Substructure		**9.8%**	**17.28**	**$28,500**
A1010	**Standard Foundations**		**3.94**	**$6,500**
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	spread footings, 3000 PSI concrete, load 25K, soil bearing capacity 3 KSF, 3' - 0" square x 12" deep			
A1030	**Slab on Grade**		**4.85**	**$8,000**
	Slab on grade, 4" thick, non industrial, reinforced			
A2010	**Basement Excavation**		**0.61**	**$1,000**
	Excavate and fill, 4000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020	**Basement Walls**		**7.88**	**$13,000**
	Foundation wall, CIP, 4 wall height, direct chute, .148 CY/LF, 7.2 PLF, 12" thick			
B Shell		**29.8%**	**52.76**	**$87,000**
B1010	**Floor Construction**		**0.91**	**$1,500**
	Wood column, 8" x 8", 20' x 20' bay, 8' unsupported height, 107 BF/MSF, 180 PSF total allowable load			
B1020	**Roof Construction**		**6.97**	**$11,500**
	Wood roof, truss, 4/12 slope, 24" O.C., 30' to 43' span			
B2010	**Exterior Walls**		**11.52**	**$19,000**
	Wood siding, 2"x4" studs 16"OC, insulated wall, 1" x 12" sawn cedar, 1" x 4" battens			
B2020	**Exterior Windows**		**18.19**	**$30,000**
	Aluminum flush tube frame, for 1/4"glass,1-3/4"x4", 5'x6' opening, no intermediate horizontals			
	Glazing panel, plate glass, 1/4" thick, tempered			
B2030	**Exterior Doors**		**5.46**	**$9,000**
	Door, aluminum & glass, without transom, full vision, double door, hardware, 6'-0" x 7'-0" opening			
	Door, aluminum & glass, with transom, non-standard, double door, hardware, 6'-0" x 10'-0" opening			
	Door, steel 18 gauge, hollow metal, 1 door with frame, no label, 3'-0" x 7'-0" opening			
B3010	**Roof Coverings**		**9.40**	**$15,500**
	Wood roofing, cedar shingles, 16" x 5", 4" min slope, 5" exposure, 1.6 PSF			
	Insulation, rigid, roof deck, fiberglass, 3'x4' or 4'x8' sheets, 15/16" thick, R370			
	Gutters, box, aluminum .027" thick, 5", enameled finish			

		% of Total	Cost Per SF	Cost
	Downspout, aluminum, rectangular, 2" x 3", embossed mill finish, .020" thick			
B3020	**Roof Openings**		0.30	$500
	Skylight, plastic domes, insulated curbs, nominal size to 10 SF, double glazing			
C Interiors		15.2%	26.99	$44,500
C1010	**Partitions**		6.06	$10,000
	Wood partition, 5/8"fire rated gypsum board face, none base, 2 x 4,@ 16" CC framing,same opposite face, 0 insul			
	5/8" gypsum board, taped & finished, painted on metal furring			
C1020	**Interior Doors**		2.12	$3,500
	Door, single leaf, wood frame, 3'-0" x 7'-0" x 1-3/8", birch, hollow core			
C1030	**Fittings**		0.61	$1,000
	Toilet partitions, cubicles, ceiling hung, plastic laminate			
C3010	**Wall Finishes**		2.12	$3,500
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Ceramic tile, thin set, 4-1/4" x 4-1/4"			
C3020	**Floor Finishes**		8.79	$14,500
	Carpet tile, nylon, fusion bonded, 18" x 18" or 24" x 24", 35 oz			
	Tile, quarry tile, mud set, minimum			
	Tile, quarry tile, mud set, maximum			
C3030	**Ceiling Finishes**		7.28	$12,000
	Acoustic ceilings, 3/4"mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support			
D Services		45.2%	80.05	$132,000
D2010	**Plumbing Fixtures**		9.10	$15,000
	Water closet, vitreous china, bowl only with flush valve, wall hung			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, vanity top, PE on CI, 20" x 18"			
	Kitchen sink w/trim, countertop, stainless steel, 44" x 22" triple bowl			
	Service sink w/trim, PE on CI,wall hung w/rim guard, 24" x 20"			
	Shower, stall, baked enamel, terrazzo receptor, 35" square			
	Water cooler, electric, wall hung, dual height, 14.3 GPH			
D2020	**Domestic Water Distribution**		6.67	$11,000
	Gas fired water heater, commercial, 100< F rise, 500 MBH input, 480 GPH			
D2040	**Rain Water Drainage**		1.52	$2,500
	Roof drain, CI, soil,singe hub, 3" diam, 10' high			
	Roof drain, CI, soil,singe hub, 3" diam, for each additional foot add			
	Roof drain, CI, soil,singe hub, 4" diam, 10' high			
	Roof drain, CI, soil,singe hub, 4" diam, for each additional foot add			
D3050	**Terminal & Package Units**		31.23	$51,500
	Rooftop, multizone, air conditioner, restaurants, 3,000 SF, 15.00 ton			
	Commercial kitchen exhaust/make-up air system, rooftop, gas, 2000 CFM			
D4010	**Sprinklers**		6.37	$10,500
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 2000 SF			
	Wet pipe sprinkler systems, steel, ordinary hazard, 1 floor, 1000 SF			
D4020	**Standpipes**		1.52	$2,500
	Wet standpipe risers, class III, steel, black, sch 40, 4" diam pipe, 1 floor			
D5010	**Electrical Service/Distribution**		11.83	$19,500
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 400 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 400 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 400 A			
D5020	**Lighting and Branch Wiring**		8.49	$14,000
	Receptacles incl plate, box, conduit, wire, 10 per 1000 SF, 1.2 watts per SF			

		% of Total	Cost Per SF	Cost
	Miscellaneous power, 1.8 watts			
	Central air conditioning power, 6 watts			
	Fluorescent fixtures recess mounted in ceiling, 1.6 watt per SF, 40 FC, 10 fixtures @32watt per 1000 SF			
D5030	**Communications and Security**		3.83	$5,000
	Communication and alarm systems, fire detection, addressable, 12 detectors, includes outlets, boxes, conduit and w			
	Fire alarm command center, addressable without voice, excl. wire & conduit			
D5090	**Other Electrical Systems**		0.30	$500
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 1			
E Equipment & Furnishings		0.0%	0.00	$0
E1090	**Other Equipment**		0.00	$0
F Special Construction		0.0%	0.00	$0
G Building Sitework		0.0%	0.00	$0
Sub Total		100%	$177.08	$292,000
Contractor's Overhead & Profit		0.0%	$0.00	$0
Architectural Fees		0.0%	$0.00	$0
User Fees		0.0%	$0.00	$0
Total Building Cost			**$177.08**	**$292,000**

BIBLIOGRAPHY

Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. *A Pattern Language: Towns, Buildings, Construction.* New York: Oxford University Press, 1977.

Allevato Architects. "The Residences at Scituate Crossing." Architectural Designs, Scituate, MA, 2008.

American Planning Association. *Planning and Urban Design Standards.* Hoboken: John Wiley & Sons, Inc., 2006.

Autodesk. *Ecotect Weather Tool.* November 22, 2009.

Autodesk Inc. *Ecotect Weather Tool.* n.d.

Ballard, Kevin. *Climate Analysis - Boston, Ma.* August 13, 2007. http://kab-2.blogspot.com/2007/08/climate-analysis-boston-ma.html (accessed November 21, 2009).

Bankrate.com. *How Construction Loans work.* n.d. http://www.bankrate.com/brm/news/mtg/20020515c.asp (accessed November 30, 2009).

Barrett, Vincent G., and John P. Blair. *How to Conduct and Analyze Real Estate Market and Feasibility Studies.* New York: Van Nostrand Reinhold Company, 1982.

Carr, Lynch and Sandell. "Greenbush Station Homes." Architectural Designs, Scituate, MA, 2005.

Cavanaro Consulting Inc. "Plot Plan for 50 Country Way." Site Survey, 2006.

Citizens' Housing and Planning Association. "Fact Sheet on Chapter 40B The State's Affordable Housing Zoning Law." 2007.

Cole, Elaine, interview by Paul Ford. *Coldwell Banker Realtor* (December 2, 2009).

ConstructionLoanCenter.com. *Rates, Fees And Closing Costs for Construction Loans.* n.d. http://www.constructionloancenter.com/rates_and_fees.htm (accessed November 30, 2009).

Curtin, Matthew, interview by Paul ford. *Leasing agent for The Old Colony Square* (November 19, 2009).

De Chiara, Joseph, and Julius Panero. *Timesaver Standards for Housing and Residential Development.* New York: McGraw Hill Companies, 1995.

Ford, Chris, interview by Paul Ford. *Owner of 50 Country Way* (December 1, 2009).

Gavin, William F. *The Massachusetts State Building Code 780 CMR seventh edition.* Boston: Secretary of the Commission, 2007.

Geren, Ronald L. "Building Classification - Part 2: Construction Types." *The Code Corner*, 2006: 1-3.

Goodwill, Julie. *Building Transit Oriented Development in Established Cities.* Tampa: Center for Urban Transportation Research, 2002.

Google. *Google Maps.* n.d. http://maps.google.com/ (accessed December 5, 2009).

Holm, Len. *Construction cost estimating: process and practices.* Upper Saddle River, NJ: Pearson/Prentice Hall, 2005.

Hopper, Leonard J. *Landscape Architectural Graphic Standards.* Hoboken: John Wiley & Sons, Inc., 2007.

Inspectapedia. *Septic Tank Size.* n.d. http://www.inspectapedia.com/septic/tanksize.htm (accessed November 30, 2009).

Logan, Gregg. *The Market for Smart Growth.* Washington, D.C.: EPA White Paper, 2007.

Massachusetts Association of Realtors. "Press Release Q3-2009." Quarterly Report, Wrentham, MA, 2009.

Massachussets Bay Transportation Authority. *MBTA Greenbush Project Frequently Asked Questions.* 2007. http://www.cbbgreenbush.com/faq.html (accessed November 23, 2009).

McKim, Jennifer B. "Renters get little relief as demand increases." *The Boston Globe*, October 27, 2009: 43.

Messner, Stephen, Bryl Boyce, Harold Trimble, and Robert Ward. *Analyzing Real Estate Opportunities: Market and Feasibility Studies.* Chicago: Realtors National Marketing Institute, 1977.

Miles, Mike E, Gayle Berens, and Marc A Weiss. *Real Estate Development Principles and*

Practices. Washington: Urban Land Institute, 2000.

MLS Property Information Network. *H3MLS.* n.d. http://www.mlspin.com/mlspin/index.html (accessed November 17, 2009).

Mortgage Q&A. n.d. http://www.mortgageqna.com/mortgage-loan-types/commercial-construction-loan-companies (accessed November 30, 2009).

Old Colony Square @ Cohasset Station. n.d. http://www.oldcolonysquare.com/ (accessed December 12, 2009).

Real Estate.com. *Scituate, Ma Community Sumary.* n.d. http://www.realestate.com/MA/Scituate/local-info.aspx (accessed November 23, 2009).

Robert Charles Lesser & Co. *Consumer Trends and Greenfield Development.* New York: Urban Land Institute, 2008.

RSMeans . *Square foot Costs 2008.* Kingston: Reed Construction Data, 2008.

RSMeans. *www.meanscostworks.com.* Kingston, November 29, 2009.

Scituate Planning Board. "Meeting Minutes." June 12, 2008.

Scituate Planning Board. "Meeting Minutes." September 22, 2005.

Scituate, Town of. "Zoning Bylaws." Scituate, MA, 2008.

Scott, James G. *Architectural Building Codes A Graphic Reference.* New York: Van Nostrand Reinhold, 1997.

Seltz, Johanna. "On track?" *The Boston Globe*, October 29, 2009: 8.

The Cecil Group, Inc. "The Greenbush Planning and Streetscape Study." 2003.

The Dartmouth Company. "Old Colony Square at Cohasset Station." 2009.

The Warren Group. *Statistics.* n.d. http://www.thewarrengroup.com/portal/PressRoom/Statistics (accessed November 17, 2009).

Town of Scituate Massachuetts - Affordable Housing Information. n.d. http://www.town.scituate.ma.us/Affordable_Housing/ (accessed November 23, 2009).

Town of Scituate Massachusetts. "Zoning Bylaws." 2008.

US Census Bureau. *2000 Profile of Scituate MA.* Washington: US Census Bureau, 2000.

USA Today. *Boston, MA Climate.* n.d. http://www.usatoday.com/weather/climate/usa/mass/wboston.htm (accessed November 22, 2009).

White, Nancy. "Transit Oriented District is Taking Shape." *Cohasset Mariner*, November 5, 2009: 15.

—. "MBTA pays $1.95M for land." *The Cohasset Mariner*, May 22, 2008: 3.

Wikipedia. *Old Colony Railroad.* n.d. http://en.wikipedia.org/wiki/Old_Colony_Railroad (accessed November 21, 2009).